2033

M3 Lee/Grant

in action

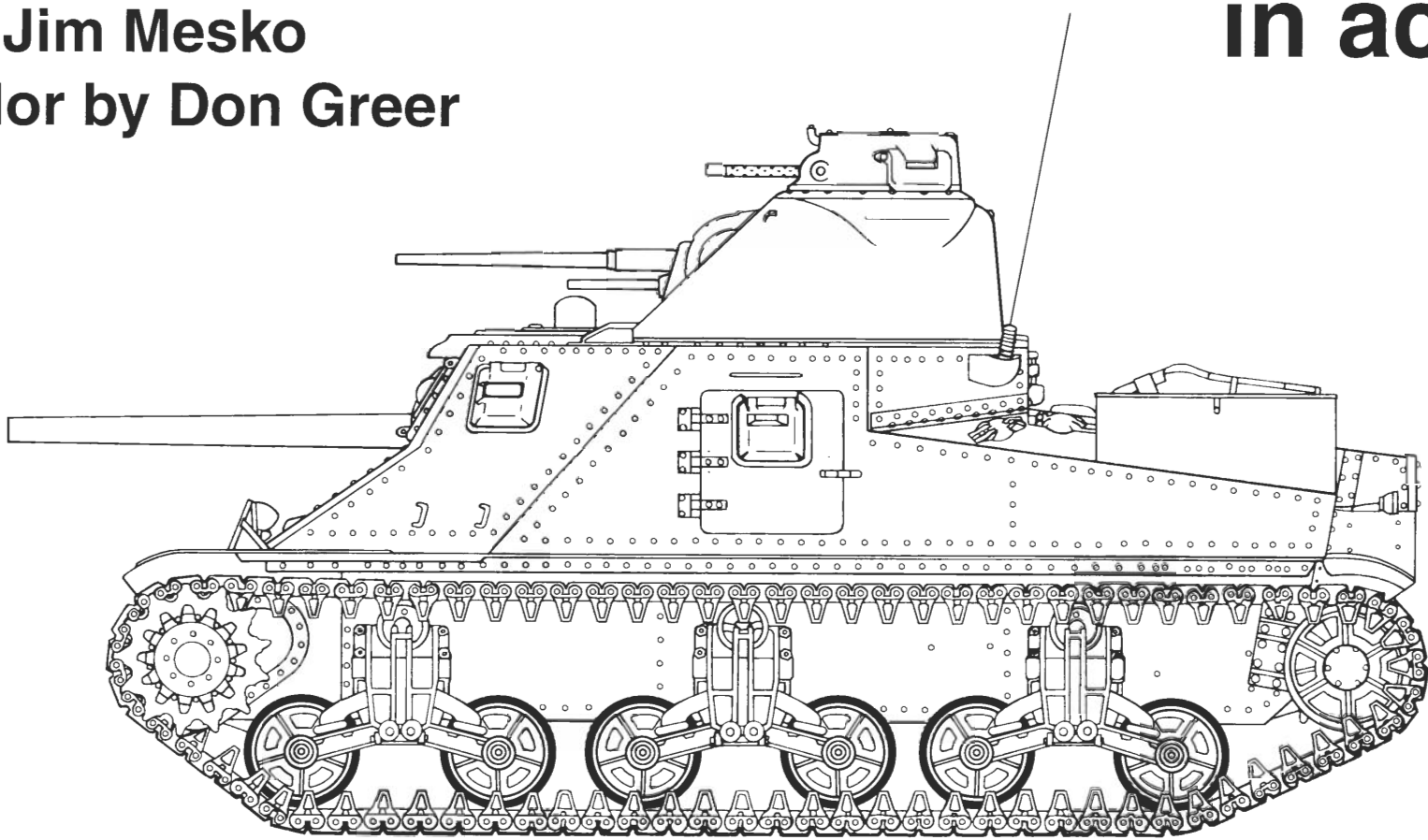
Armor Number 33

squadron/signal publications

M3 Lee/Grant

in action

By Jim Mesko
Color by Don Greer



Armor Number 33
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M3 Lees of Company D, 2nd Battalion, 13th Armored Regiment, 1st Armored Division move into position near Souk el Khemis, North Africa during November of 1942.

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The crew of a British Grant look down at a burning Pz I as they advance across the North African desert. Until the arrival of the Grant, the British had felt that their tanks were both inferior to and outnumbered by Rommel's Afrika Korps, although in reality this was not the case. The Grant did give the British a tank which could fire high explosive shells, which British tanks had been unable to do. The relatively heavy armor of the Grant, its reliability and heavy armament, helped restore British confidence and came as a nasty surprise to Rommel during the opening phases of the Battle of Gazala. This tank is from A Squadron, as indicated by the triangle on the turret, and carries a multi-tone camouflage pattern. The stowage of extra gear on the outside of the tank was typical of British tanks in the desert. (Hunnicutt)

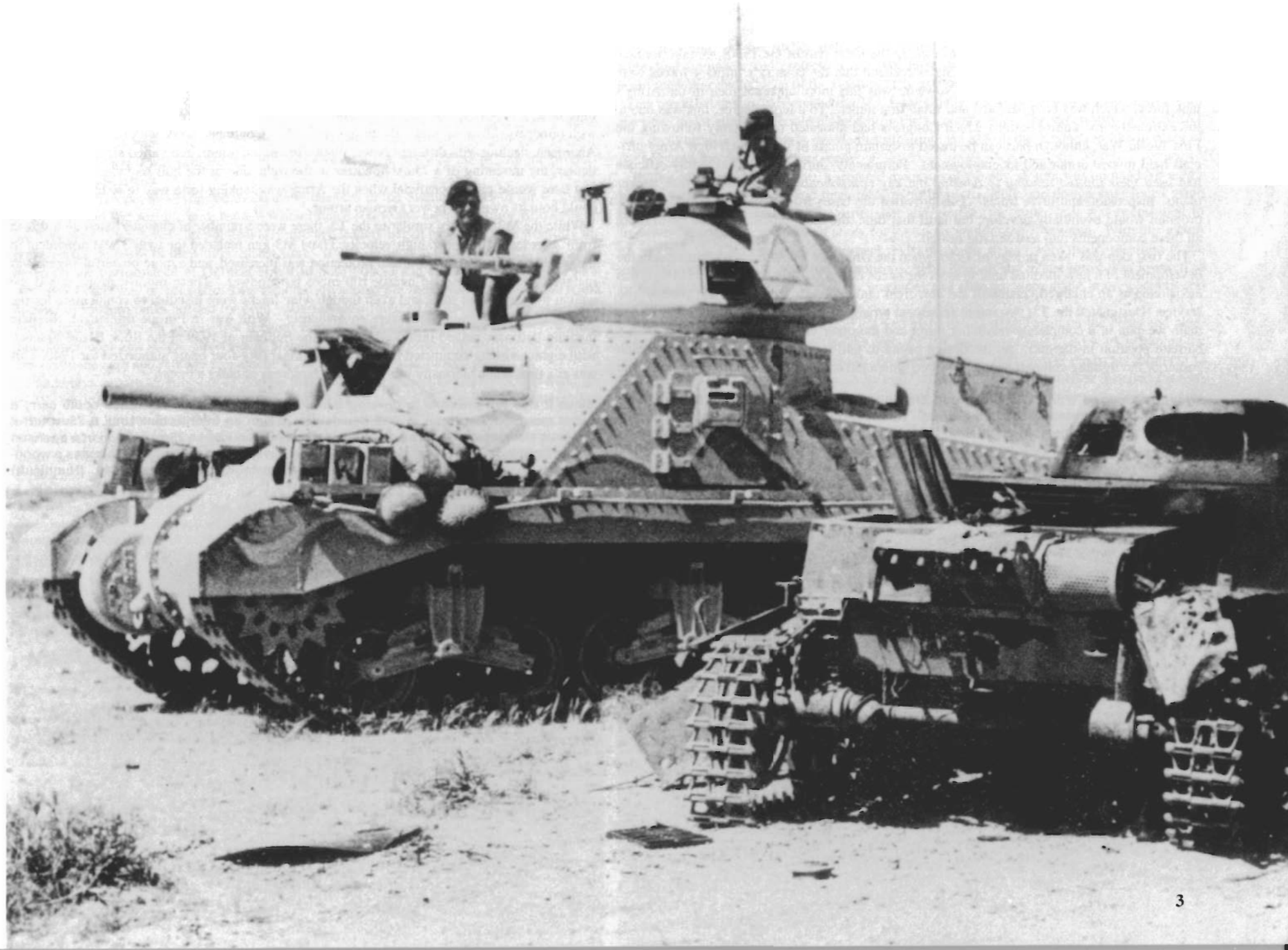
Acknowledgements

A special Thank You to all those people, without whose help this book would have been impossible.
Richard Hunnicutt
Patton Armor Museum Staff
Lennart Lundh
Michael Green
James V Crow

Dedication

To the memory of "Lady Bug," who brought joy and happiness to all those who's lives she touched.

To Doctor Ben Pearson and his staff. Their kindness, compassion and concern helped make her passing easier to bear.



Introduction

As war clouds began to gather over Europe in the latter part of the 1930s, certain political and military leaders within the United States realized that the country's military forces were ill-equipped for any serious conflict. Nowhere was this more apparent then in the Army's tank force, which was both outdated and small in number. To a large degree, this was due to the extremely low appropriations which Congress had allocated to the Army following the First World War, although part can be traced to certain points of view which high Army officials held toward armor and its employment. Fortunately, during this period, Army officials had used their limited funding to develop the key components of tank construction, power plants, suspension and drive trains. This provided the bases from which the American tank program would eventually develop, but until that time, the main problem wound be to bring all these components into a successful design.

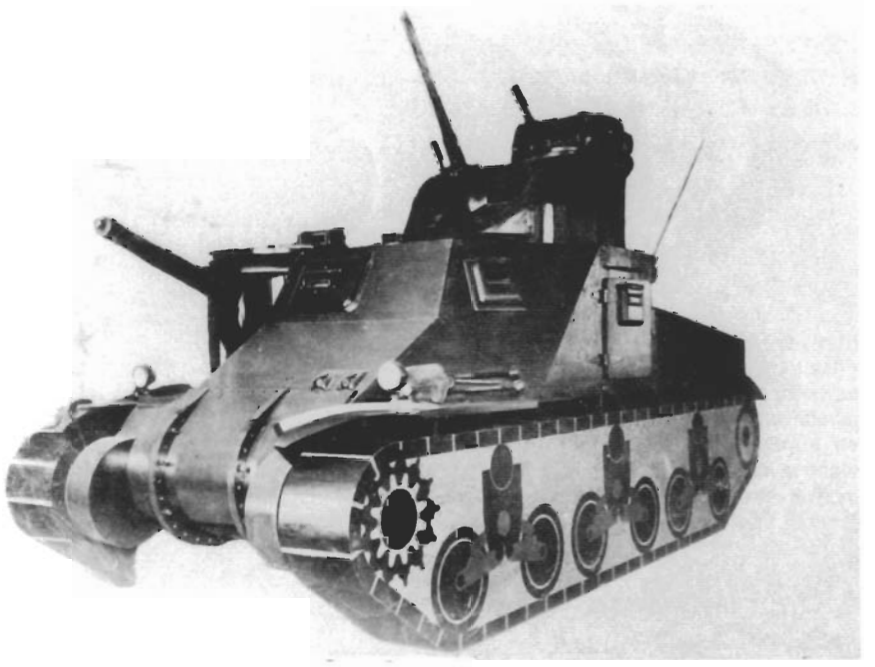
The first step was taken in May of 1936, when the Ordnance Department recommended the development of a new medium tank to meet the needs of the Infantry branch. This design was envisioned as an enlarged version of the new light tank, the M2: which was just coming into service. Designated the T5, two initial armament arrangements were envisioned, one with the main weapon in a completely revolving turret and the other mounting the main weapon in a barrette position in the hull. As the design began to jell, four sponsons were added to each corner of the fighting compartment, each fitted with a .30 caliber air cooled machine gun. The initial model was delivered in the later part of 1937, although, at the time, the new 37MM cannon, then under development was not ready for installation. In its place, a dummy gun was used to simulate the weight, which was eventually replaced with twin 37MM cannon of an older model.

In early 1938, the T5 was shipped to the Aberdeen Proving Grounds (APG) for testing. Powered by an air-cooled radial engine and using the vertical volute suspension of the M2 light tank, the vehicle was judged suitable for Army needs and recommended for production with minor modification under the designation M2. Continued work with the T5 was done at Aberdeen, dealing with different power plants, increased armor, and varied armament. In particular, the mounting of a 75MM howitzer in the right side of the hull provided valuable data and later would prove beneficial when the Army was looking for a way to field a tank which could hold its own with newer German armor.

While the M2 was very similar to the T5, there were a number of changes based on test data from Aberdeen. The new, high velocity 37MM M3 gun replaced the twin 37MM armament in the welded, slab sided turret, armor protection was increased, and a more powerful engine was installed, which developed nearly 100 more horsepower. These modifications raised the weight by nearly four tons, and even though wide tracks were installed to compensate for the additional weight, ground pressure rose sharply. With war in Europe immanent, the new medium tank was rushed into production in the Summer of 1939 at the Rock Island Arsenal, with eighteen being contracted for and an additional fifty-four being authorized for 1940. This was at a time when Germany was producing hundreds of tanks a month.

When the Second World War broke out, the United States had one of the smallest and most obsolete armored forces in the world. This was due to budget constraints and outdated military doctrines. In an attempt to upgrade its forces, the M2 and M2A1 medium tanks were developed from components of the M2 light tank. By the time these tanks were ready for production, events in Europe had shown just how obsolete they were and the M2 and M2A1 never saw combat, being relegated to the training role. This M2 was taking part in an exercise during 1940 with the Third Army. The main difference between the M2 and M2A1 was in the turret and more powerful engine. (PAM)

Since it was not possible to develop a new tank to replace the M2 which could carry a turret mounted 75MM gun, it was decided to design an interim tank until a 75MM turret could be developed. This resulted in the M3 which mounted a 75MM cannon in a sponson on the right side and a 37MM gun in a revolving turret on top of the hull. This was a wooden mock-up which was shown at the Aberdeen Proving Grounds in late 1940. (Hunnicutt)



By August, Abdereen had an M2 for testing and lessons from this, and the T5 program, led to a number of additional changes in the M2 production line. These included: increased armor protection, a larger roomier turret and a new engine. The 400 hp Wright R975EC2 air-cooled radial engine gave an increase of 50 hp over the earlier engine used in the M2. Weight went up by approximately two tons, but with the more powerful engine, the speed stayed the same and with a wider track, ground pressure actually dropped. The gun mount received additional armor protection, the sponson machine guns were fitted with rotor shields and tubular sights and improvement were made in the steering, transmission, suspension and fuel system. Designated M2A1, it was decided to substitute this model in place of the M2 on the production line at Rock Island.

Events in Europe; however, led to dramatic changes in the Summer of 1940 for U.S. tank production and the Army's tank force. When France fell to the German armor Blitzkrieg in the Spring of 1940, American political and military leaders began to realize how woefully ill-prepared the defenses of the United States were. It was decided to form a separate tank corps based on the performance of German armor in both Poland and France. Initially, this new Armored Force was to consist of two armored divisions, but there were no where near the number of modern tanks needed for even such a modest force. The Rock Island Arsenal was such a small production facility that it could in no way produce the needed number of tanks then anticipated and so the government began to look at the possibility of private industry, especially the auto and railroad manufactures, as a source for tank procurement.

In addition, reports coming out of Europe indicated that the main German medium tank, the Pz IV, was armed with a 75MM gun, thus rendering the M2's main armament obsolete even before it went into production.

While the best thing to do would have been to mount a 75MM cannon in a turret on top of a modified M2A1, there was no turret available which could hold such a weapon. Based on experience with the T7 program mounting a 75MM howitzer in the right side of the hull, a design was proposed for mounting a similar caliber weapon in a modified M2A1 in place of the right machine gun. Even though such a design would leave the gun with a limited traverse, it would, at least suffice until a new 75MM turret could be built. In order to provide additional firepower and protection, a 37MM turret with a full 360 degree field of fire was positioned over the left side of the fighting compartment.

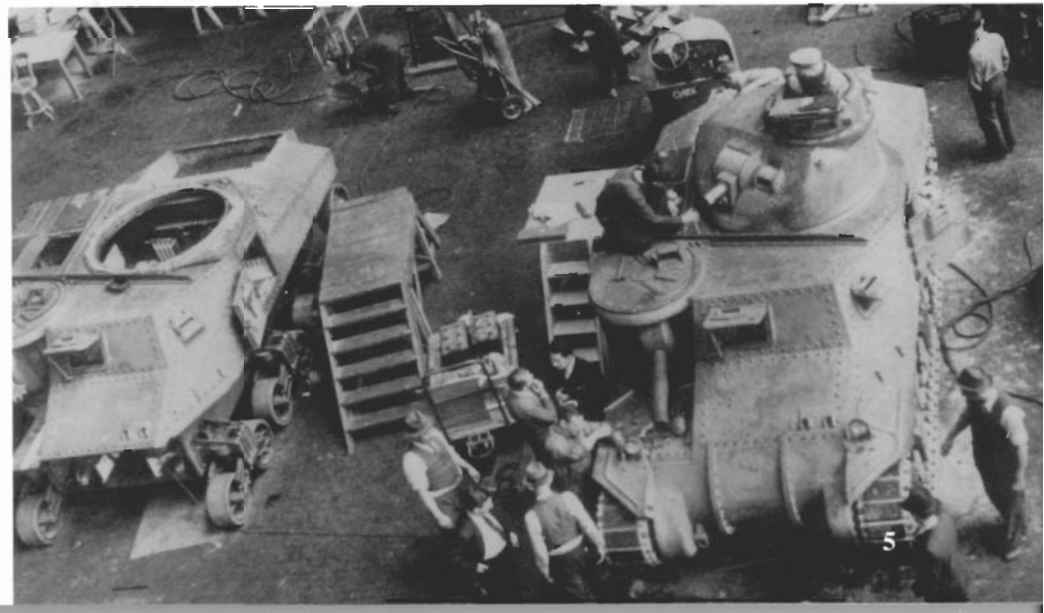
This modified design, designated the M3, was initially felt to be only an interim design until the new 75MM gun turret could replace it on the assembly line. The superiority to the M2A1 was such; however, that it was decided to substitute the M3 on the production line in place of the M2 until the new design was ready.

By the end of August of 1940, a wooded mock-up of the new design was on hand for members of the Armored Force and manufactures to inspect. While the design envisioned using basically the M2A1 lower hull, suspension and engine, the upper hull was redesigned to improve the armor protection and allow for the sponson mounted 75MM gun. With this wooden mock-up as a starting point, additional revisions in the design were made, resulting in the complete deletion of the remaining sponsons. The floor of the 37MM turret was lowered to increase head room, fuel capacity was increased and changes were made in crew safety and visibility.

The revised design was accepted in the Fall of 1940 and work began on the plans and blueprints needed for its production. By the end of 1940, these were ready and work began on the pilot model at the Rock Island Arsenal. By mid-March of 1941, it was ready for shipment to Aberdeen where it was mated up with its cast 37MM turret, which had been installed for testing on a M2. This first M3 was followed, in late Spring, by other pilot models from the various builders and by the end of the Summer of 1941, full scale production of the new tank was well underway at four plants. These included: American Locomotive Company, Chrysler's Detroit Tank Arsenal, Pressed Steel Car Company and Pullman Standard Car Company. With this production starting up, the United States was finally in the tank business and events would soon show that it was not a day too early.

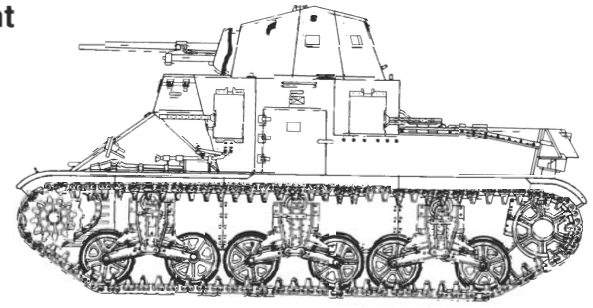
The original pilot model of the M3, built at the Rock Island Arsenal, is displayed at Aberdeen where it was sent in March of 1941. It was shipped without the 37MM turret which was latter installed at the base. The commanders cupola had only one vision port on the right side, with all later variants of the M3 having two. (PAM)

M3 production pilot models number one and two are assembled at the Detroit Tank Arsenal in the Spring of 1941. While there would be changes made throughout the production life of the M3, the basic design was never really drastically altered. (Hunnicutt)

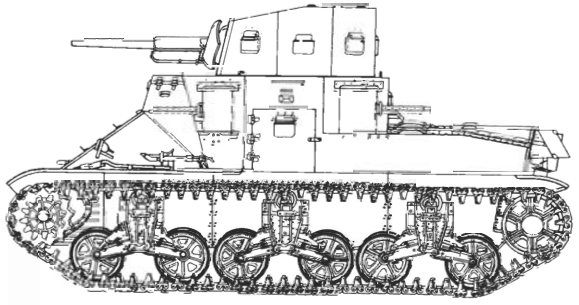


Development

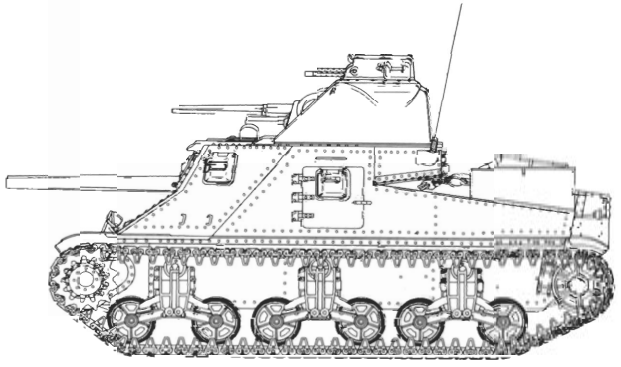
M2



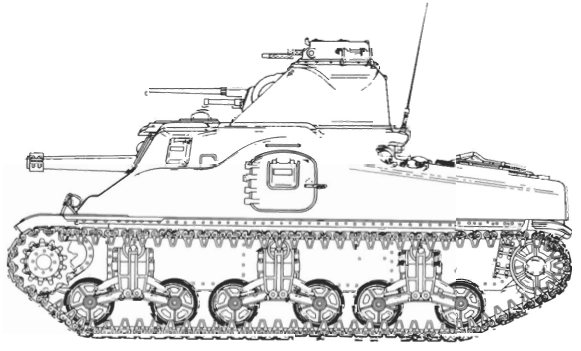
M2A1



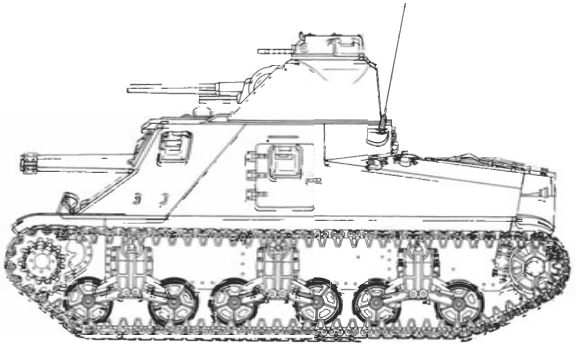
M3



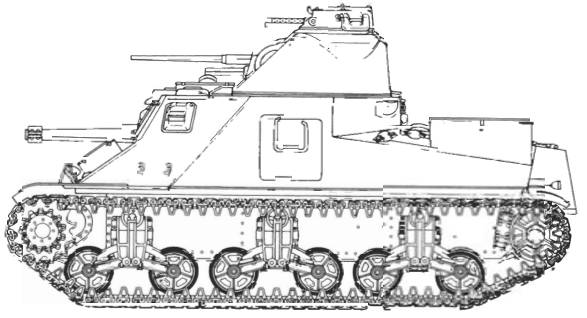
M3A1



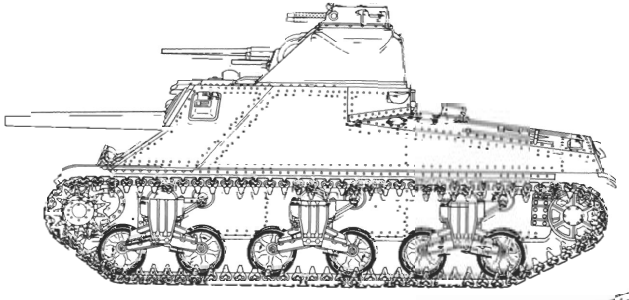
M3A2



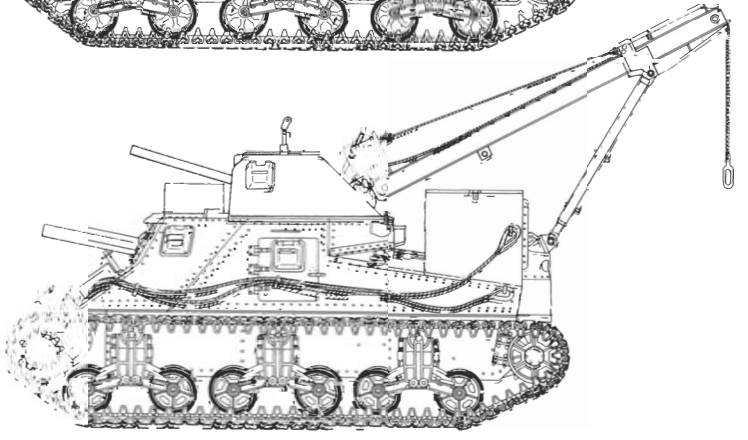
M3A3



M3A4



M31



M3

While the M3 ancestry to the M2 and M2A1 was fairly obvious under close scrutiny, outwardly the new tank differed radically from its predecessor. Using the same engine and suspension of the M2 series, the hull was lengthened and widened to provide adequate room for the new 75MM cannon mounted in the right side. The fighting compartment was enlarged and extended further back to also allow adequate room for the 37MM turret and turret basket, which was moved left of center and further back than on the M2A1. In addition, this turret and its cupola were made of cast armor. Armor protection was increased significantly, ranging between 1.5 to 2 inches on the front and sides. These rolled, homogeneous armor plates were held together with rivets, which would prove very susceptible to flying off when hit by enemy fire. When this occurred, the flying fragments could cause severe damage inside the hull to both crew and equipment, but at the time this was not a cause of great concern.

The new tank weighed in at close to 31 tons. The 400 hp Wright R975 EC2 air-cooled radial could propel the M3 at between 21 to 24 mph over normal roads. From the engine compartment in the rear, a long drive shaft ran through the fighting compartment to a five speed sychromesh transmission in the forward part of the hull. Power was then transferred to the drive sprockets via the differential. This unit was covered by a three-piece cast housing which was bolted together, giving the forward lower hull a distinct look which was retained on all subsequent versions of the M3.

For its time, the M43 was fairly well armed. Its 75MM cannon was designed to use ammunition similar to the French 75MM artillery piece which had been adopted by the U.S. during the First World War. Initially, the 75MM gun was envisioned as only being used in a supporting role rather than for anti-tank use. As a result, the barrel was shortened, cutting down on its velocity, and this gun, designated 75MM Gun M2, was the original weapon installed. Later a more powerful 75MM gun, the M3, with a longer barrel and greater muzzle velocity was fitted which proved to be an effective anti-tank weapon. Both weapons were able to be mounted in the M1 gun mount, but since the M2 gun had a shorter barrel, a counterweight had to be added to the barrel to balance it. Since the M3 gun had a longer barrel, this counterweight was not needed.

On top of the fighting compartment to the left and rear was the cast turret, fitted with the M6 37MM cannon, the latest version of this gun available. A .30 caliber machine gun was mounted coaxial with it and an additional .30 caliber gun was mounted in a small cupola on top of the turret. Two additional .30 caliber machine guns were fitted to the front glacis plate for use by the driver. These were in a non-flexible mount and could be used for general suppression fire.

Initially, to operate the M3 tank took a crew of seven. The driver sat in the center of the compartment with the radio operator to his left and slightly behind him. To his right was the 75MM gunner and loader. The tank commander sat in the rear of the 37MM turret with the gunner seated to his lower left, and the loader to his lower right. Access to, or escape from the M3 was via two side doors, a hatch on top of the hull behind the 75MM gun and through the cupola. Crew visibility was fairly good, with the driver having a view port and hatch combination and the full crew having four pistol ports, one next to the drivers position, one on each of the hull doors and one to the rear. An additional one was fitted to the 37MM turret on the left side and the commander's cupola had two vision ports. Two periscopes were also fitted and each gun had its own sight.

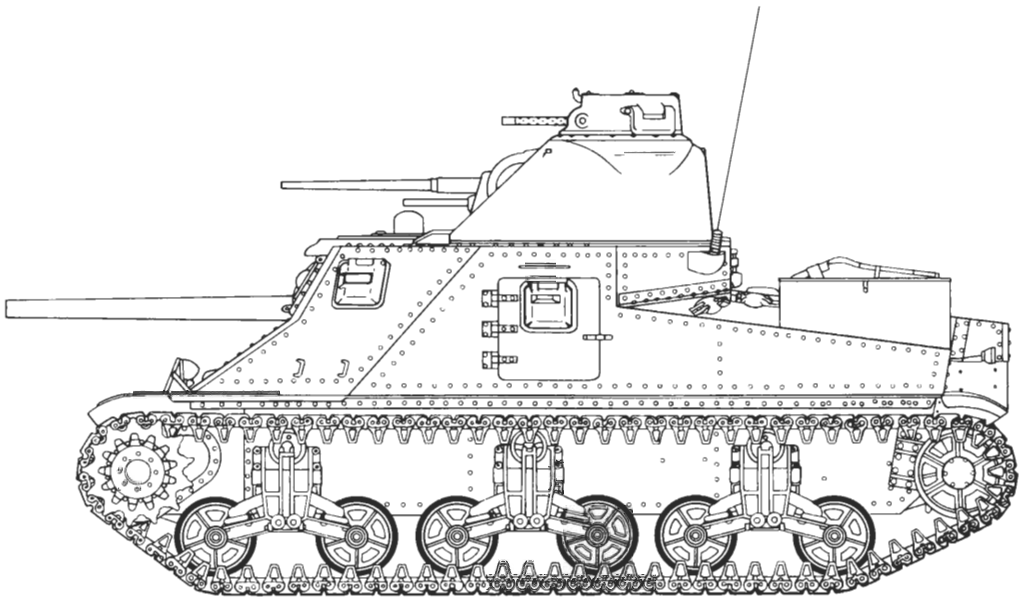
While initial test trials at Aberdeen showed the soundness of the M3 design, a number of problems were discovered which needed to be rectified. Perhaps the most noticeable was the build-up of carbon monoxide fumes to dangerous levels when the guns were fired while the tank was buttoned up. New ventilators were installed on top of the 37MM turret, over to the left of the driver on the fighting compartment roof and on top of the escape hatch on the roof behind the 75MM gun. These helped reduce the carbon monoxide to a safe level, but the one ventilator on the hatch made it heavy and awkward to handle, and it was moved to a position behind the hatch.

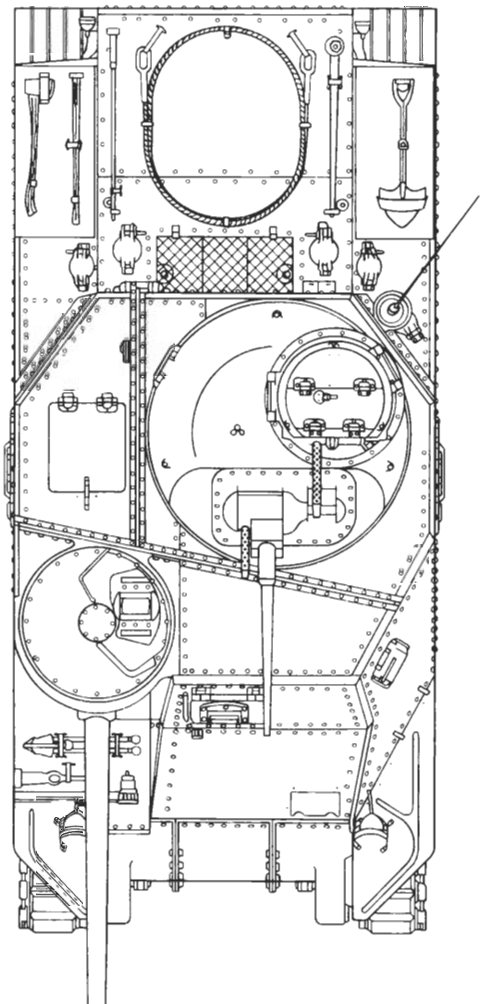
The vertical volute suspension, designed for the light M2 tanks, had a short life due to the much higher weight of the M3. It was eventually redesigned with heavier springs being added, and had the return roller moved to the rear on a new bracket. A track skid guide was also added on top of the suspension where the roller used to be and this redesigned system eventually replaced the early one on the assembly line, although this was done very late in M3 production This suspension eventually became the main one used on the M3's descendent, the M4 Sherman.

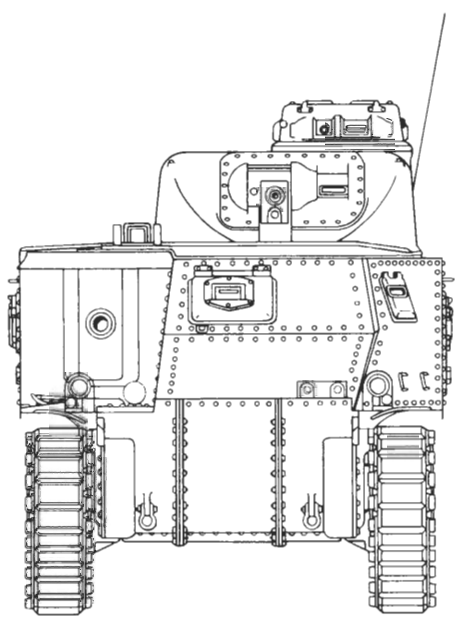
Ballistic tests also showed that both the 37MM and 75MM guns could have their rotors damaged by small arms fire, which could prevent the guns from moving. Special auxiliary shields were designed for the fronts of the guns but these appear to have been rarely fitted. It was also found that the side doors were susceptible to battle damage and the recommendation was made to delete them. In their place an escape hatch was added to the floor. Again this change took place relatively late in production, although some hulls had their doors welded shut. The pistol port on the left side was deleted, but the one on the right was retained.

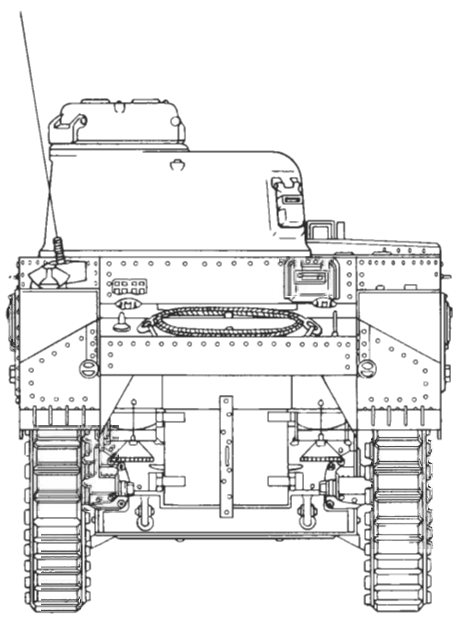
Other minor changes were made throughout the M3's production. To help alleviate cramped conditions in the fighting compartment, two large storage boxes were added on top

While the M3 was based on the general design of the M2/M2A1, it bore little resemblence to its predessor except for the suspension. The main drawback of the M3 was its excessive height, limited traverse of its main gun and riveted construction. These were offset by its ruggedness, reliability and fairly thick armor. (Hunnicutt)





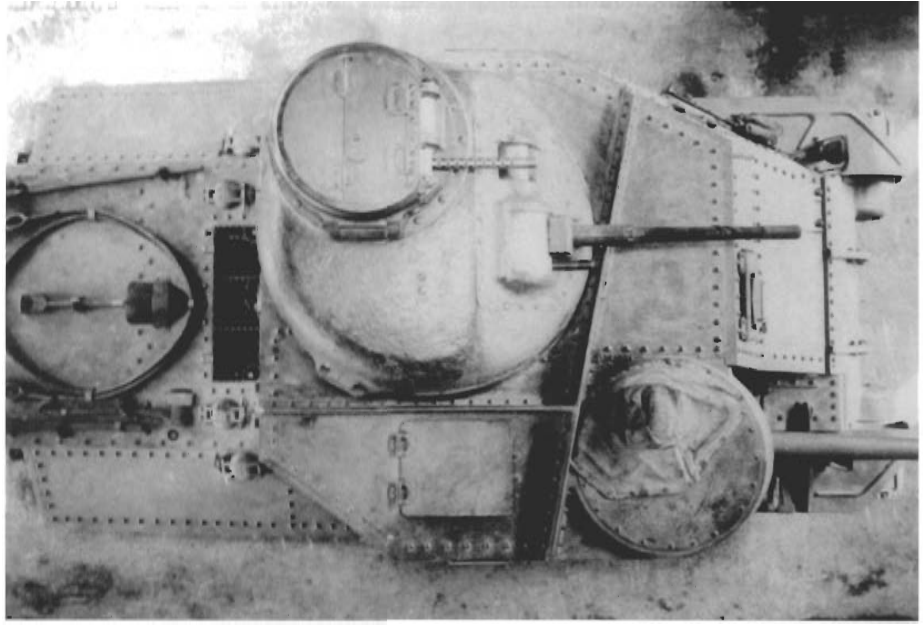




Specification

M3 Lee

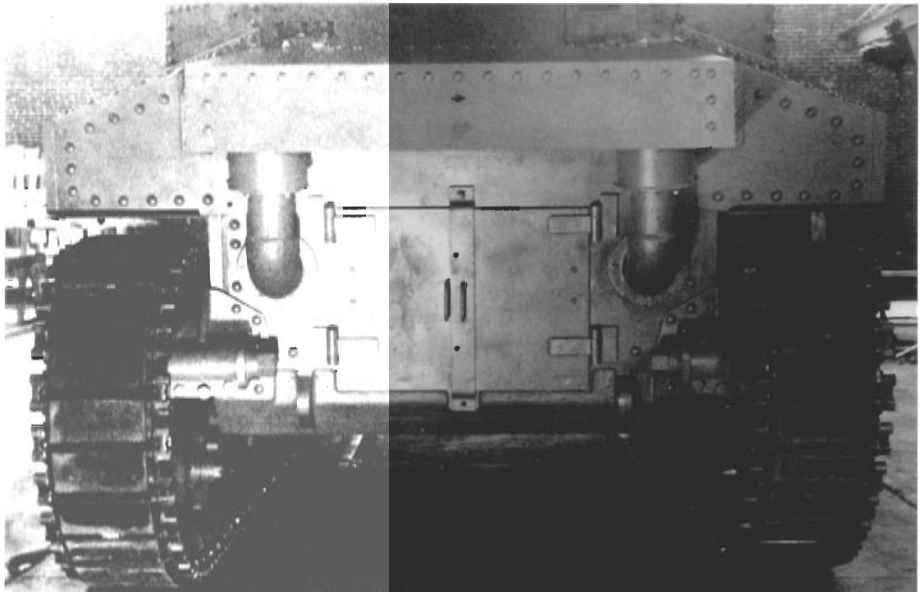
Length.....18 feet 6 inches (5.63 m)
Height.....10 feet 3 inches (3.12 m)
Speed.....21 mph (33.7 kph)
Range.....120 miles (193 km)
Weight.....61,500 pounds (27,896.4 kg)
Crew.....Six
Powerplant.....One 340 hp Continental R-975-EC-2 radial engine.
Armament.....One 75MM cannon, one 37MM cannon and four .30 caliber machine guns.



The main gun of the M3 had a limited traverse. Access to the vehicle was through two side hatches or through the hatchs behind the main gun and on the commanders cupola. The cupola was fitted with a .30 caliber machine gun and could traverse 360 degrees, as could the 37MM turret. The combination of two guns gave the M3 an advantage since it could fire in two directions, which helped compensate for the limited traverse of the main gun. (PAM)

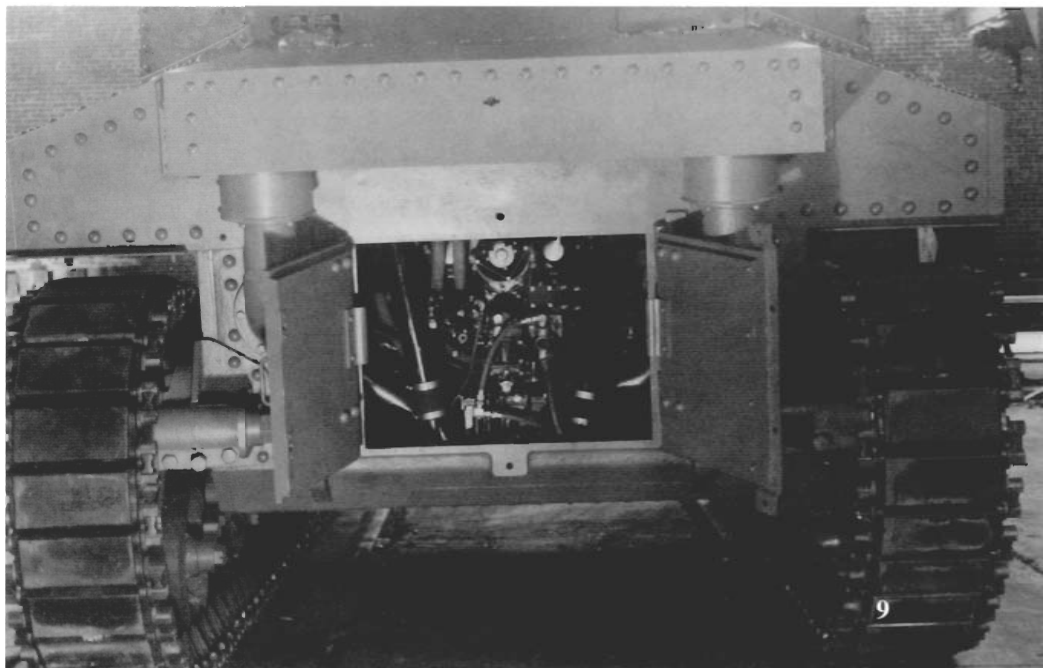
of the rear deck above the tracks. In order to cut down on the crew size, it was decided to eliminate the radio operator and assign his duties to the driver. One of the fixed hull machine guns were also deleted, and its hole was sealed with a steel plug.

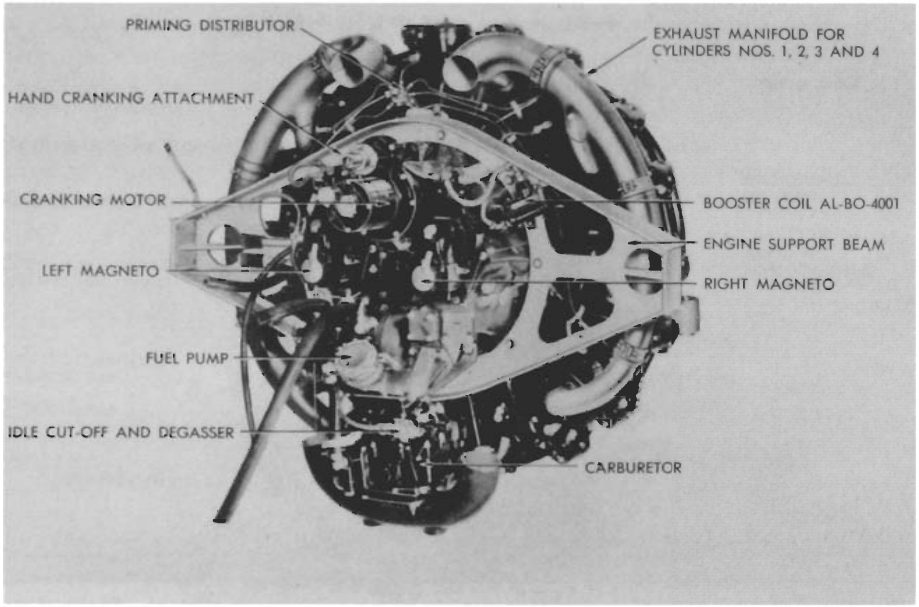
The M3 used the same type of engine as the M2A1, the Wright R975 EC2 air-cooled radial. Access to the engine was through two doors at t he rear of the hull or by removal of the rear deck when major repairs or maintenance was needed. (Hunnicutt)



The size of the rivets used in the construction of the vehicle are evident. These rivits caused problems since they had a tendency to fly off when the vehicle was hit by enemy fire, which could cause tremendous damage to men and equipment inside the vehicle. (Author)

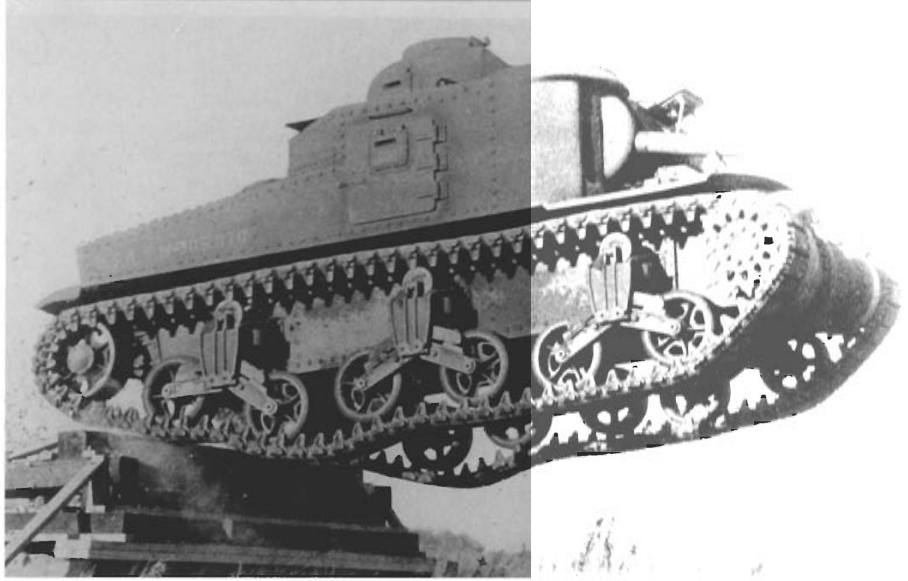
The limited access allowed by the rear hull doors made major repairs impossible. The round objects on either side of the doors are the mufflers, which did not to reduce the overall noise level greatly since the radial power plant was extremely load. (Hunnicutt)





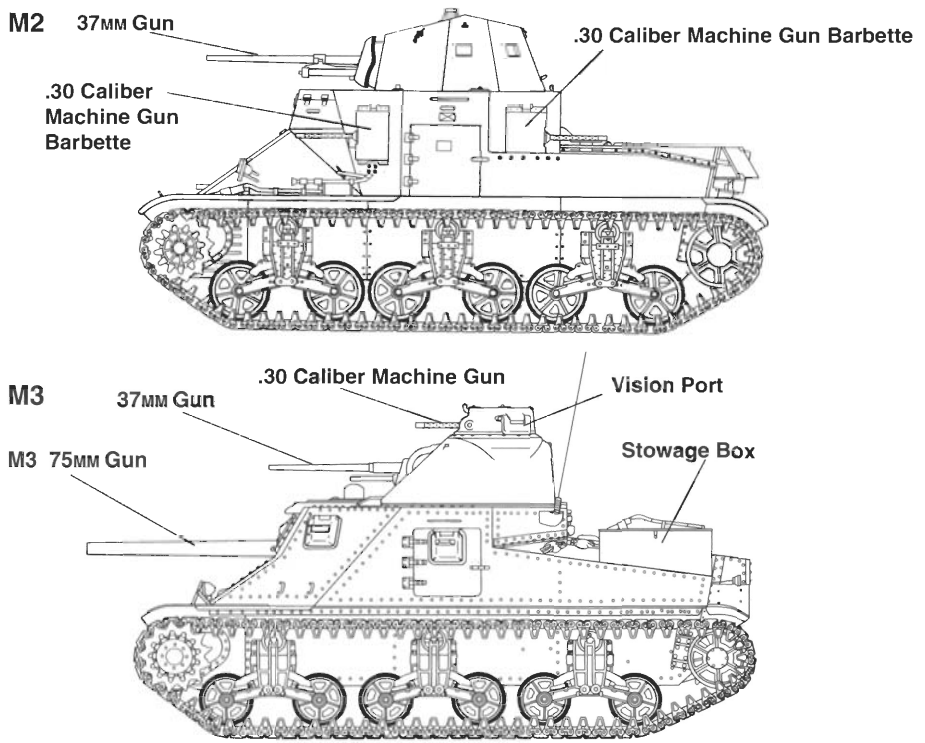
The M3 was powered a Wright air-cooled radial engine; which, although large and bulky, provide power for both the M3 and certain variants of the later M4 Sherman. (Hunnicutt)

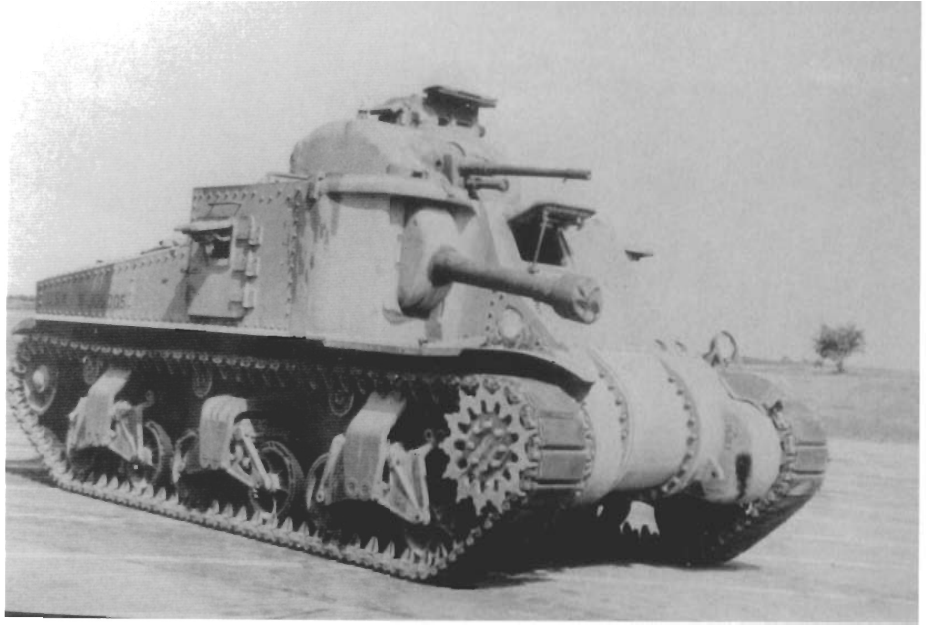
This is the way the suspension would react under normal conditions. The weight shifts toward the rear of the tank as it climbs a small rise. Then the rear suspension springs compress while those on the front extend down as the weight is taken off of them. This M3 is armed with the short barreled M2 75MM gun, which often used a counterweight at its tip to balance it. The side doors were a feature of early models of the M3 and were either welded shut or done away with on later variants. (Hunnicutt)



The M3 suspension was a modified version of the suspension used on the M2 light tank. This vertical volute suspension proved to be too light for the heavier weight of the M3 and was later beefed up with more power springs and had the return roller moved rearward and a track guide was installed on top of it. While demonstrations such as this were very dramatic, this type of use was frowned upon due to the damage it could cause and its effects on the crew. (Hunnicutt)

Development

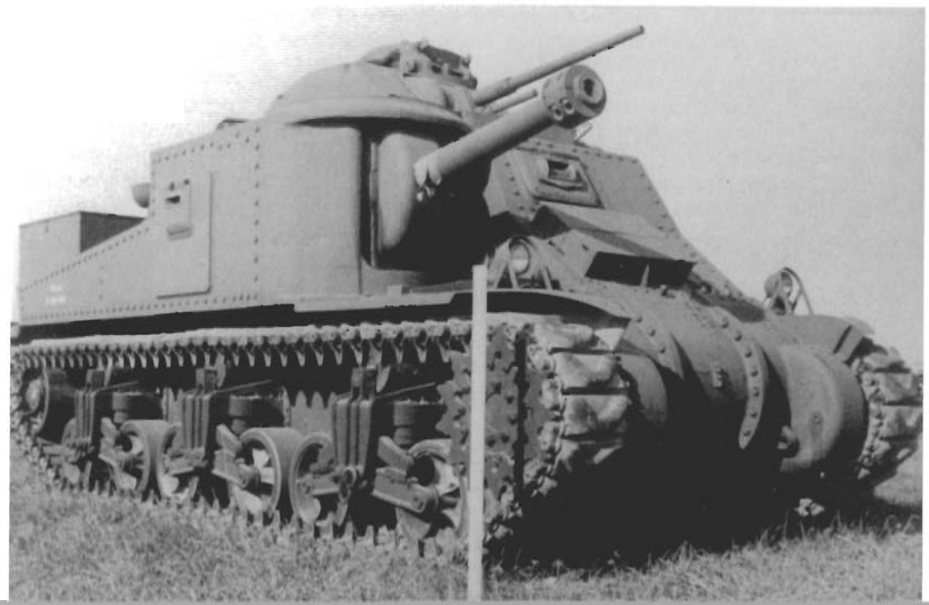




This M3 has been fitted with a horizontal volute spring suspension, which was never used on production M3s. It did eventually see usage in a modified form on late model M4s. The 75MM cannon has been fitted with the counterbalance on its barrel, which also had a dust cover over it. (PAM)

The counterbalance was fitted to the end of the 75MM cannon barrel and held together by two bolts on either side. The cannon rifling is visible just inside the end of the barrel. (Author)

This late model M3 has its doors welded shut and has its main gun fitted with the barrel counterweight. Eventually, the doors were replaced with a solid piece of armor plate. (Lundh)

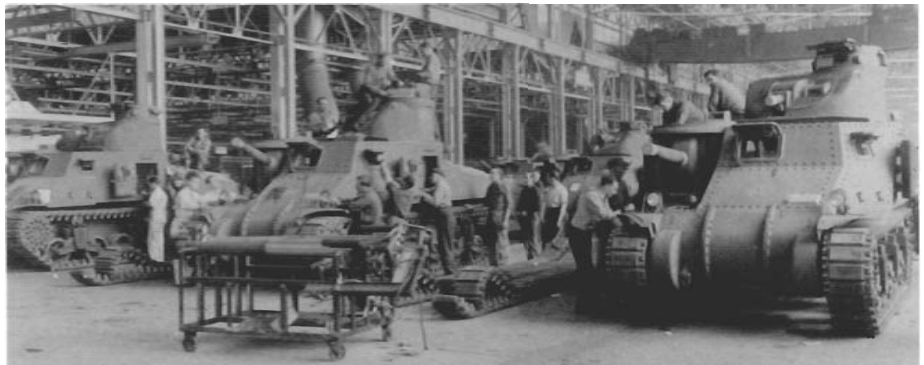


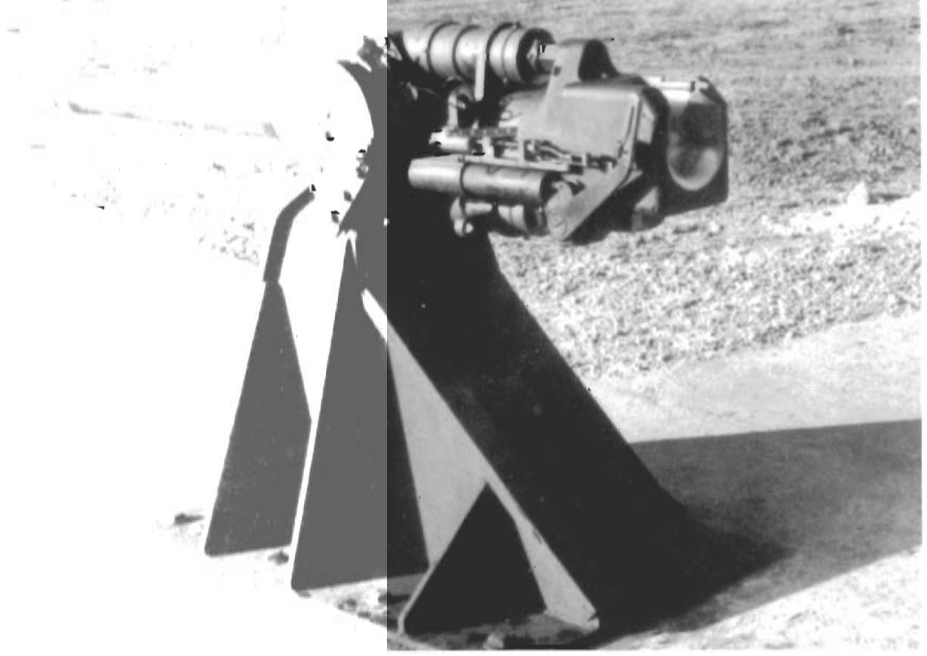
The late production M3 was armed with the longer barreled M3 75MM cannon, which did not need a counterbalance weight. It has had the side doors totally eliminated. While the vision port on the left side was eliminated, the one on the right was retained.

Early M3s, such as this one on the assembly line, were not equipped with an escape hatch underneath the hull due to the two side hatches. When the hatches were deleted one was added under the hull at the right rear of the fighting compartment. (Hunnicutt)

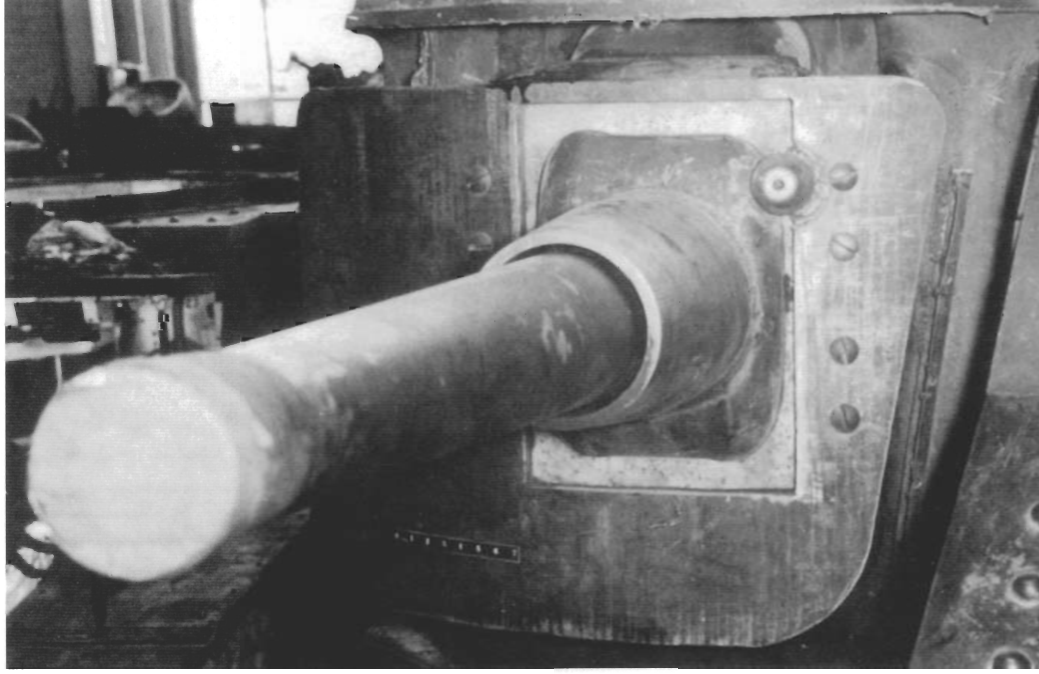
The driver, located in the center of the hull, had a large vision port covered by an armored flap. Another vision port is visible to the left. In addition to these and those on the side doors, there was another on the rear right side of the fitting compartment. There were also two on the commanders cupola and one on the turret. (Hunnicutt)

The M3 was the first tank which was mass produced by American industry. Unfortunately, there were some shortages of critical equipment in the early stages of production and some tanks were delivered without one or both of their main guns. All the M3s shown here have not been fitted with their 37MM guns. The three piece transmission cover on the bow was typical of all M3s and it was not replaced with a single piece unit until after the start of M4 production. (Hunnicutt)



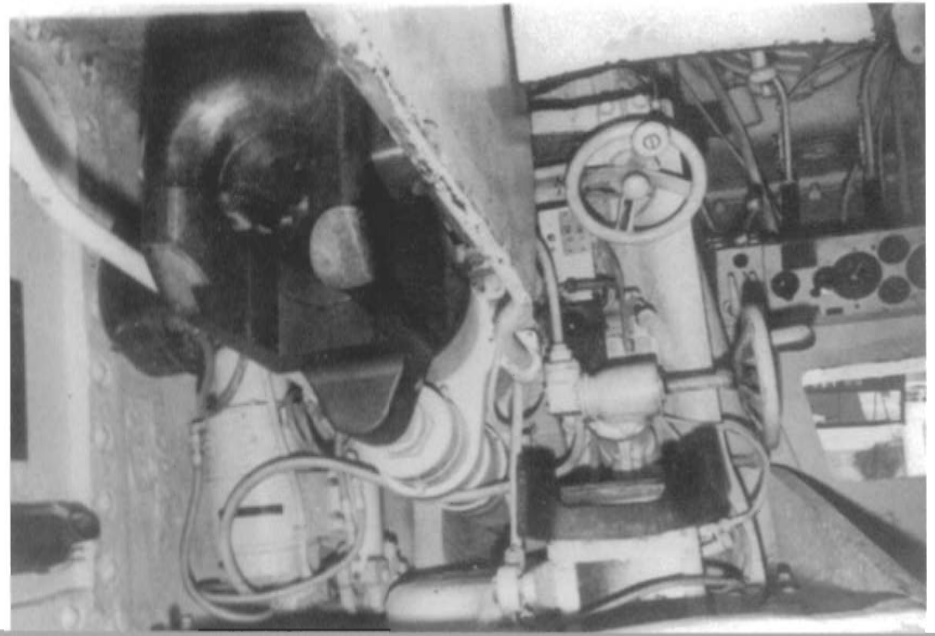


The main armament of the early M3 was the M2 75MM cannon based on the French 75MM artillery piece adopted by the U.S. during the First World War. A later version, the M3 had a longer barrel with increased muzzle velocity. At the time, this weapon could fire a variety of shells, which proved extremely worthwhile when the British took the tank into combat. (Lundh)

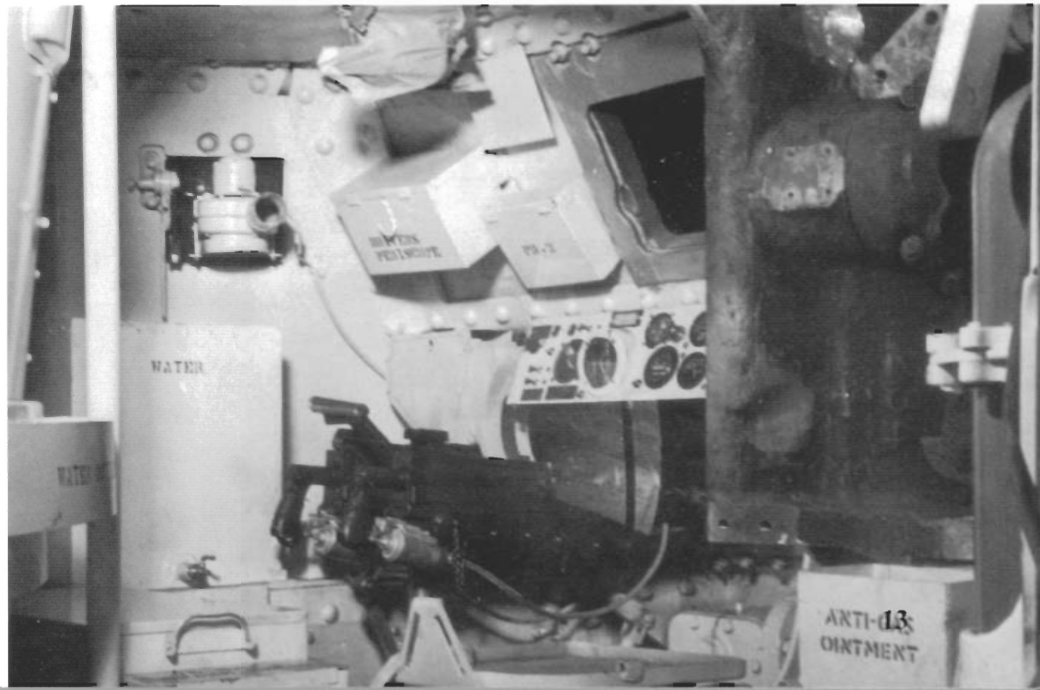


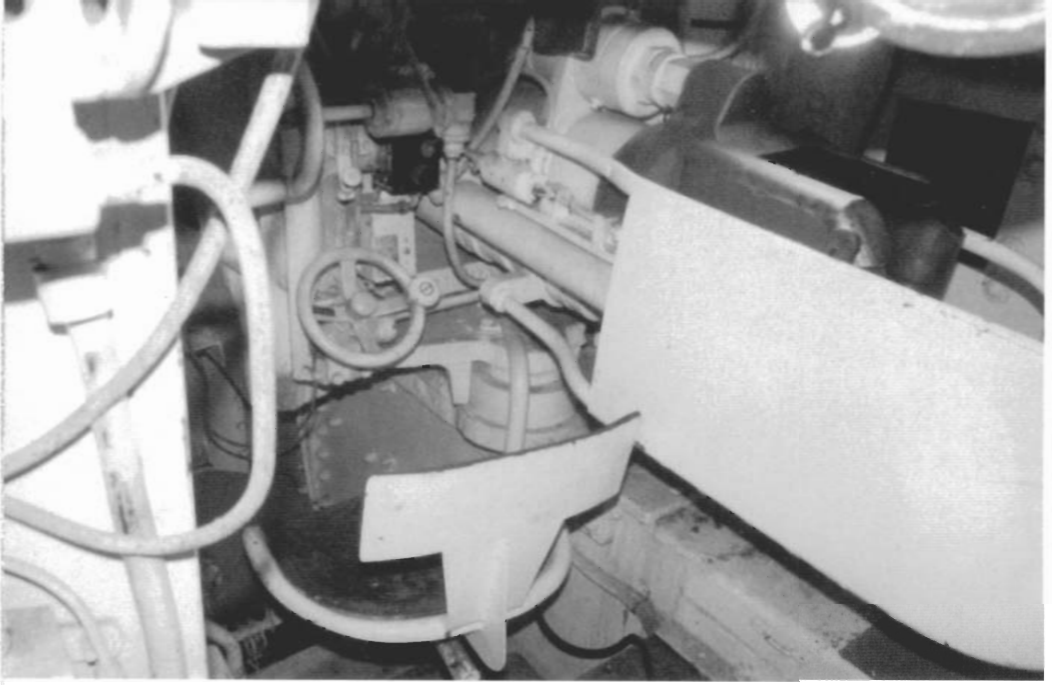
The rotors on both the 37MM and 75MM guns could be damaged by small arms fire or shrapnel, which could hinder or stop their movement. Auxiliary shields were developed to prevent this and could be bolted on, but these did not see widespread usage. (Hunnicutt)

Despite its size, the interior of the M3 was not that roomy, since there was a large amount of equipment crammed into every available space. The 75MM cannon and its mount took up most of the right side. The traverse and elevation hand wheels were located to the left of the gun. Directly above the upper wheel was the gunners sight. The recoil guard protecting the loader is located right next to the breech mechanism. (PAM)

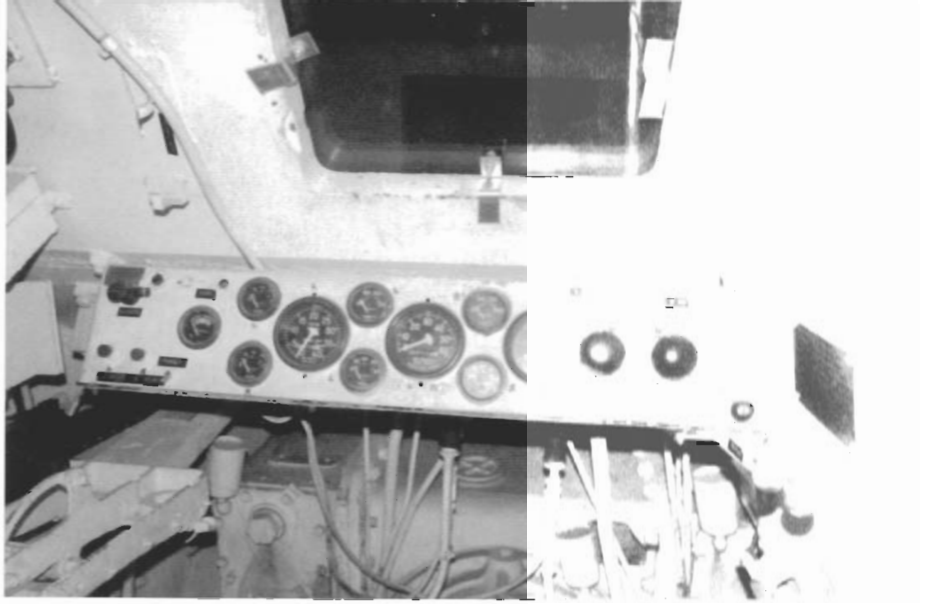


The drivers compartment of a M3. In the center are two .30 caliber air-cooled machine guns , which were fixed to fire forward. In later variants of the M3, one of these guns was deleted and its opening blocked with a steel plug. (Hunnicutt)



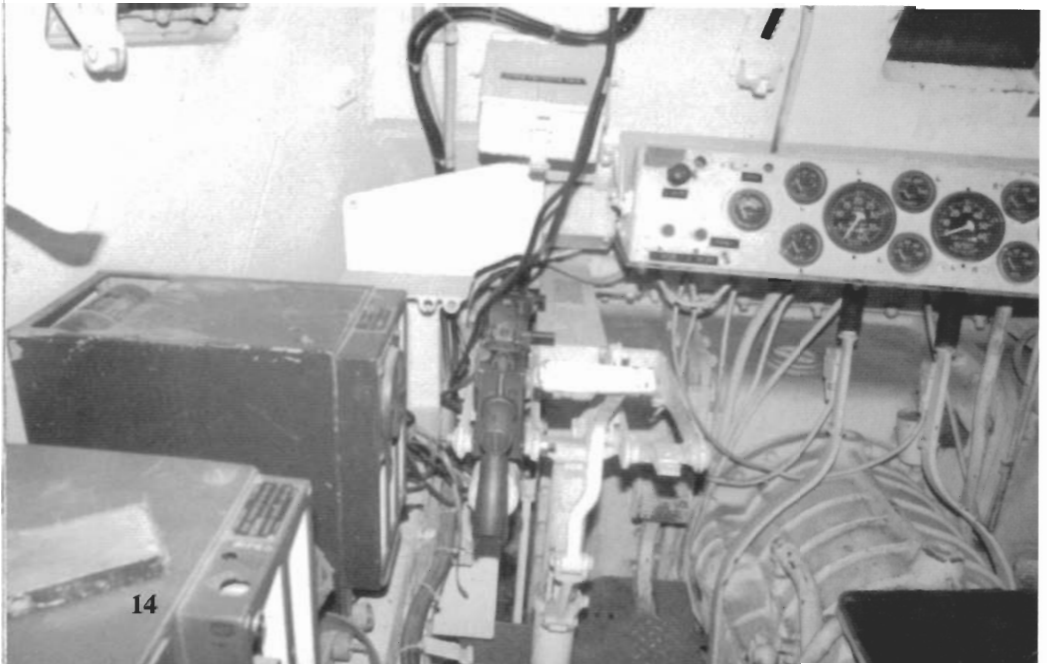


The aimer sat right next to the 75MM gun. The lower wheel is for traversing the weapon, while that above it is for elevating the gun. Part of the recoil mechanism is visible just in front of the breechblock. (Green)

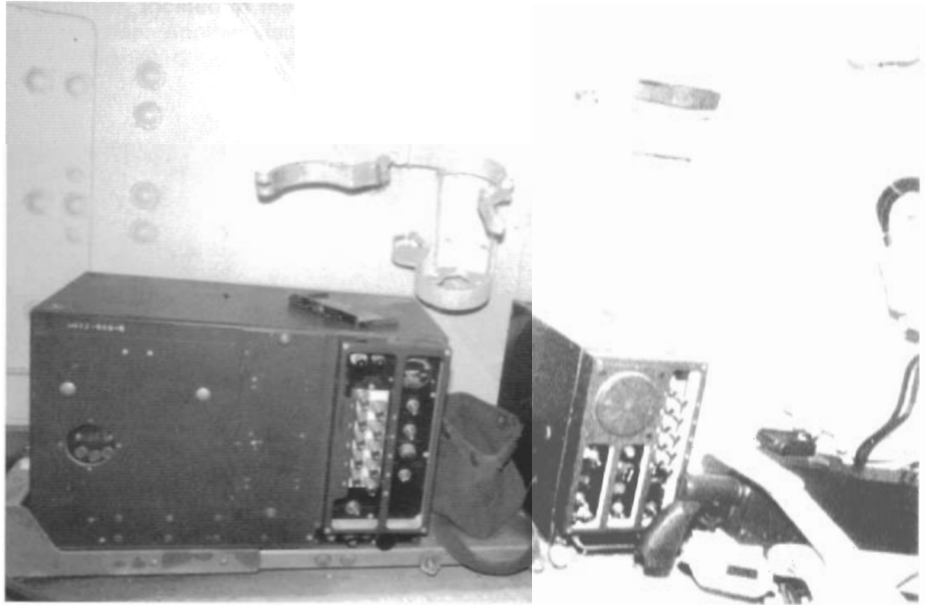


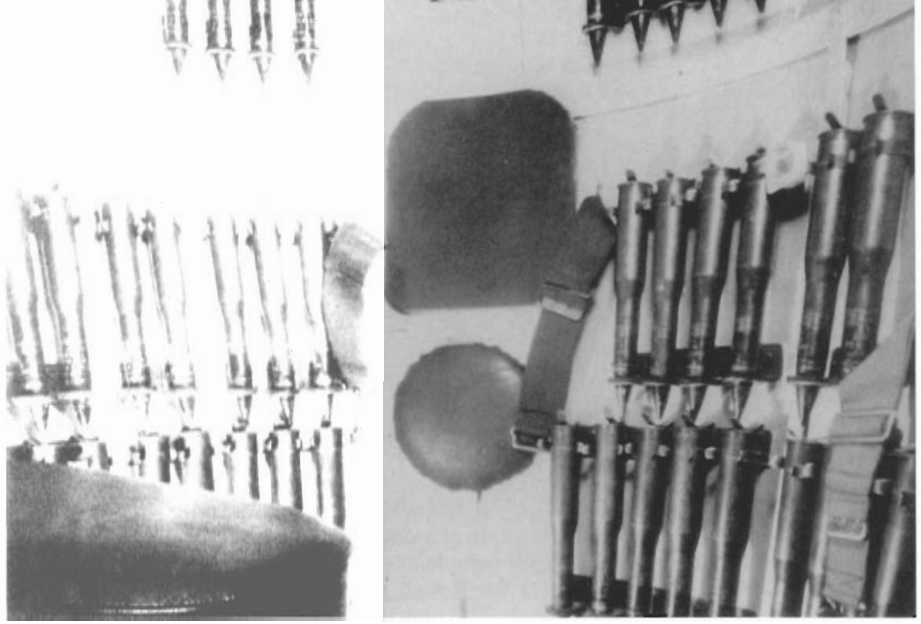
The control panel was relatively simple and varied only slightly, if at all, between models. The size of the drivers hatch allowed for excellent visibility when conditions allowed for it to be open. (Green)

The driver sets astride the transmission housing and operated the tank by controlling the track movement on each side through shifting the five speed synchromesh transmission. His control levers and pedals are visible on either side of the transmission housing. (Green)



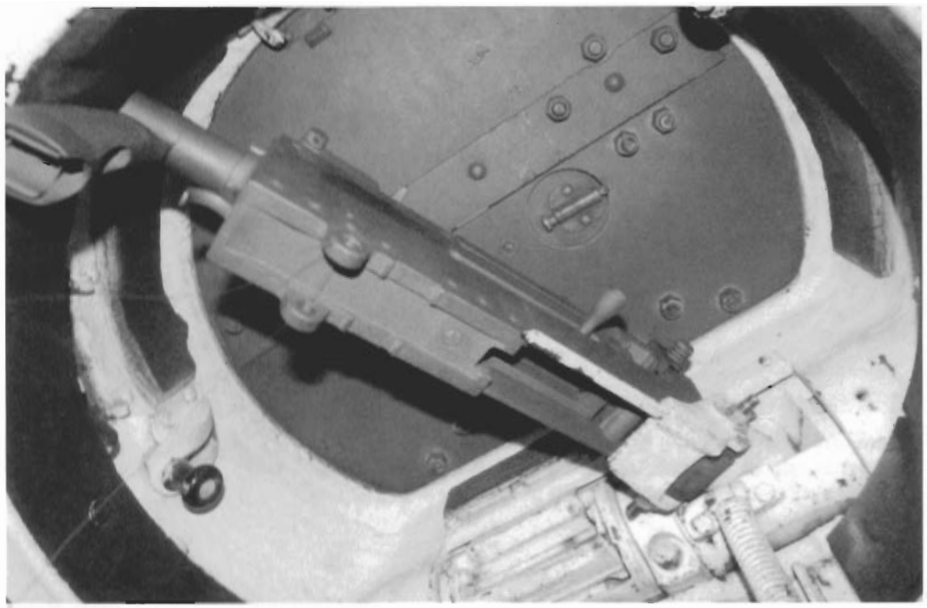
The radio operator sat to the left of the driver in the original M3 design, but eventually it was decided to eliminate his position and allot his duties it to the driver. To the right can be seen one of the fixed .30 caliber machine guns. In early M3s, there were two of these, but one was later deleted with a steel plug being used to fill in the gun port. (Green)

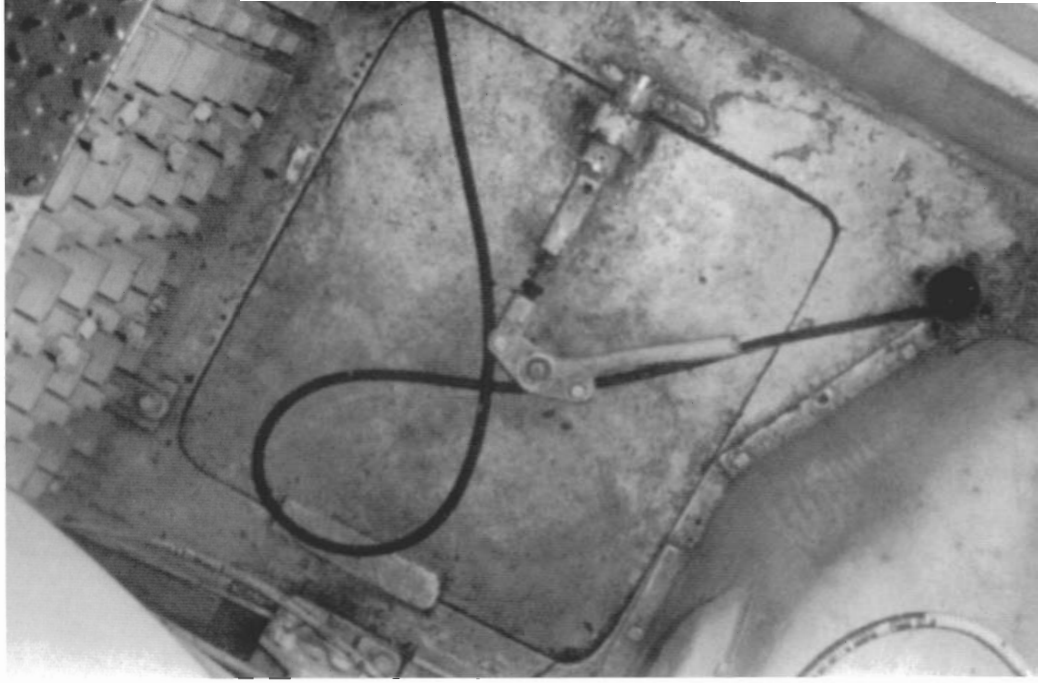




Behind the driver and radio operator was the turret basket for the the 37MM gun. In it were racks for 37MM ready rounds and the seats for the gunner and loader. Fifty-one rounds of 37MM ammunition were carried in the turret and turret basket. Though a snail caliber weapon, the 37MM gun was fairly close in performance to similar British and German guns. (PAM)

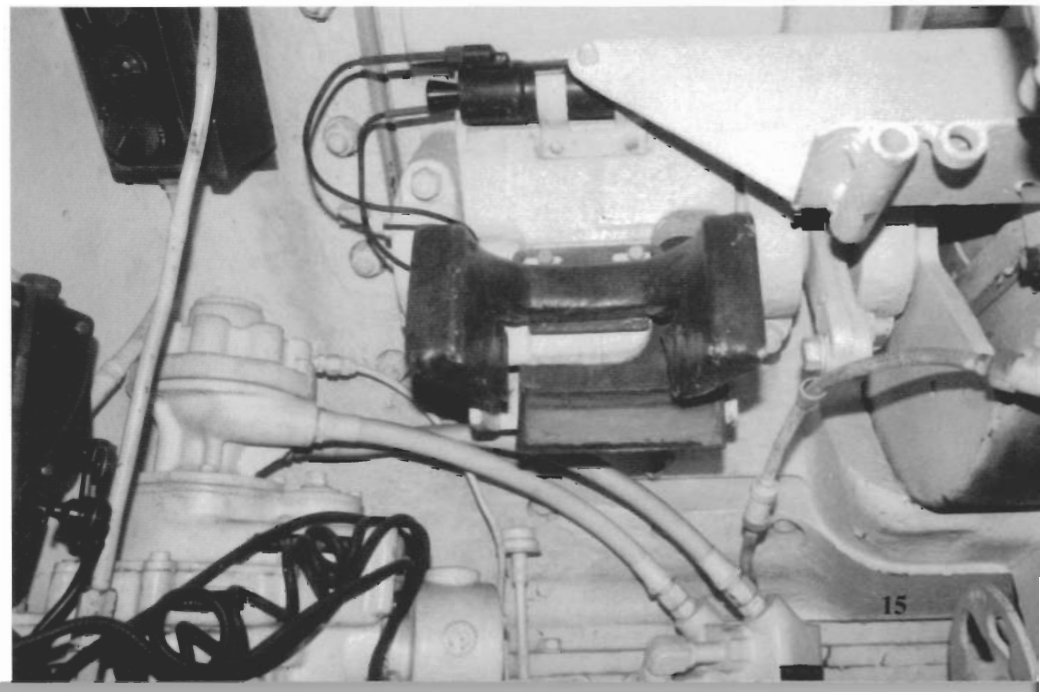
The tank commander had a .30 caliber machine gun mounted in the cupola to engage ground or aerial targets in addition to another . 30 caliber machine mounted co-axially with the 37MM gun. This cupola arrangement made for crowded conditions, to say the least. (Green)





When the side doors were eliminated on late production vehicles, a floor escape hatch was provided to the right rear of the fighting compartment. (Author)

The gunner's sight for 37MM cannon was located to the left of the gun, part of which is visible to the right. The turret could be traversed either manually or hydraulically and could do a complete 360 degree circle in twenty seconds. It could be elevated to 60 degrees and depressed to minus 7 degrees. The gun had a rate of fire of thirty rounds per minute. (Green)

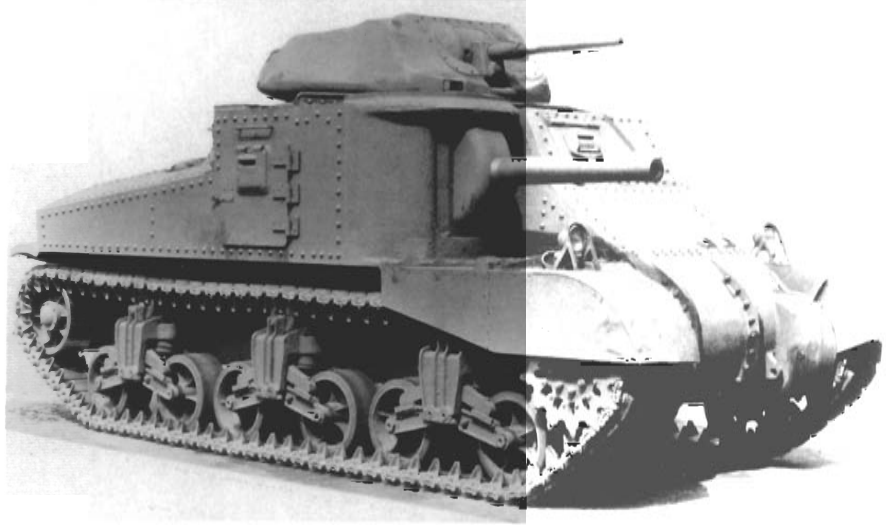


British M3s

Following the fall of France in the Spring of 1940, the British were in desperate need of replacement armored vehicles to make up for their losses when their army was evacuated from the continent at Dunkirk. With an eye toward elevating this problem, a British mission came to the U.S. and suggested that American factories produce British designs. For a variety of reasons; however, they were told this was not possible and only indigenous designs accepted by the U.S. Army were acceptable. An agreement was reached whereby certain changes in the basic American design would be allowed for a British contract.

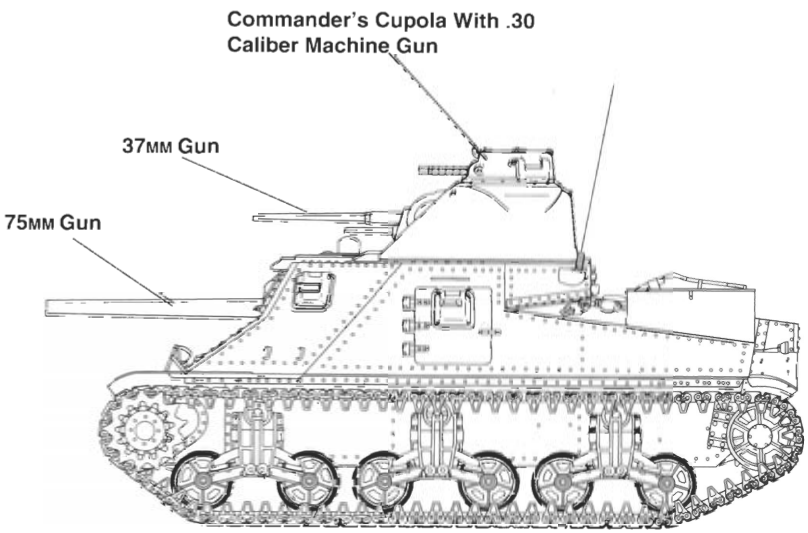
The British examined the M3 and decided that, while the basic design was acceptable, the tank's profile was too high. To solve this problem, a new 37MM turret was built which would fit the standard diameter of the turret ring. This new turret was wider, which gave the crew more room and allowed the radio to be relocated from the hull to a bustle in the rear of the turret. To lower the height, the commander's cupola was eliminated and replaced with a split hatch, which rotated. Provisions were also made to mount a hand held machine gun on the ring. A single periscope was mounted on one hatch plate. Some other minor changes were made internally to handle certain items of British equipment, but otherwise, the only other noticeable change was the addition of sand skirts on the fenders. Some late production models also had an auxiliary fuel tank over the right rear sponson and mud chutes added between the suspension bogies.

As was common with the British, they gave their version of the M3 a name, calling the vehicle the General Grant I. The American model, which they also eventually received, was referred to as the General Lee I. While the nickname Lee was never really used by American troops, British and Commonwealth troops normally used the name Grant when referring to the M3. The Grant was produced for the British by the Baldwin Locomotive Works, Pressed Steel Car Company, and the Pullman Standard Car Company, with American Locomotive and Chrysler producing the Lee. Eventually, nearly 5,000 M3s were built.

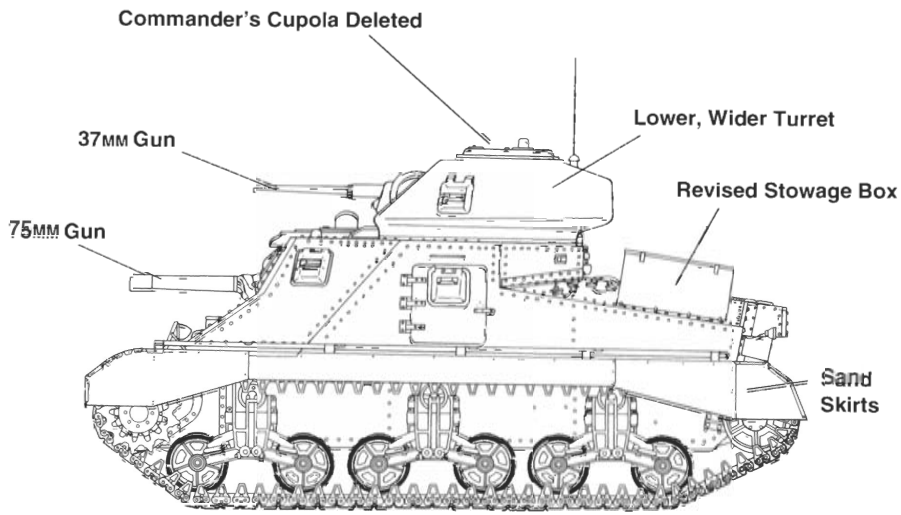


Although the British liked the M3 design, they asked for a number of changes to make it more acceptable to them. Their biggest complaint was that it had too high profile and a new roomier turret was designed for the British version. This also allowed them to mount the radio in the rear of the turret. The new turret gave the tank a much different look and this version was called the General Grant. (Hunnicutt)

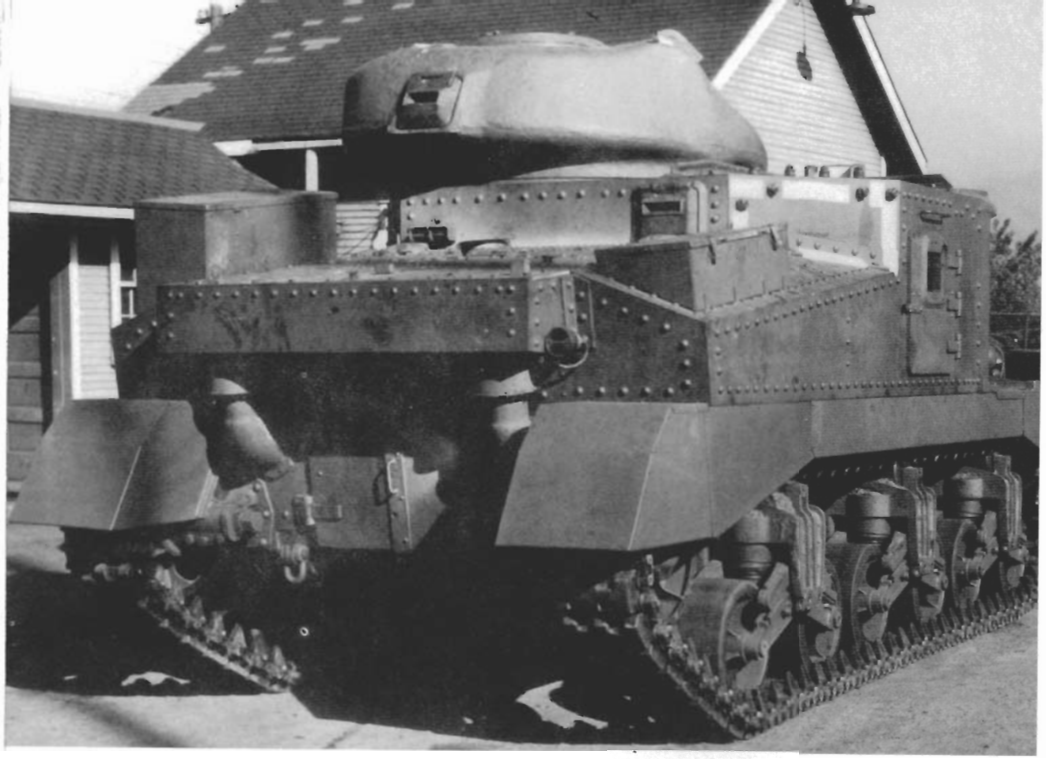
M3 Lee



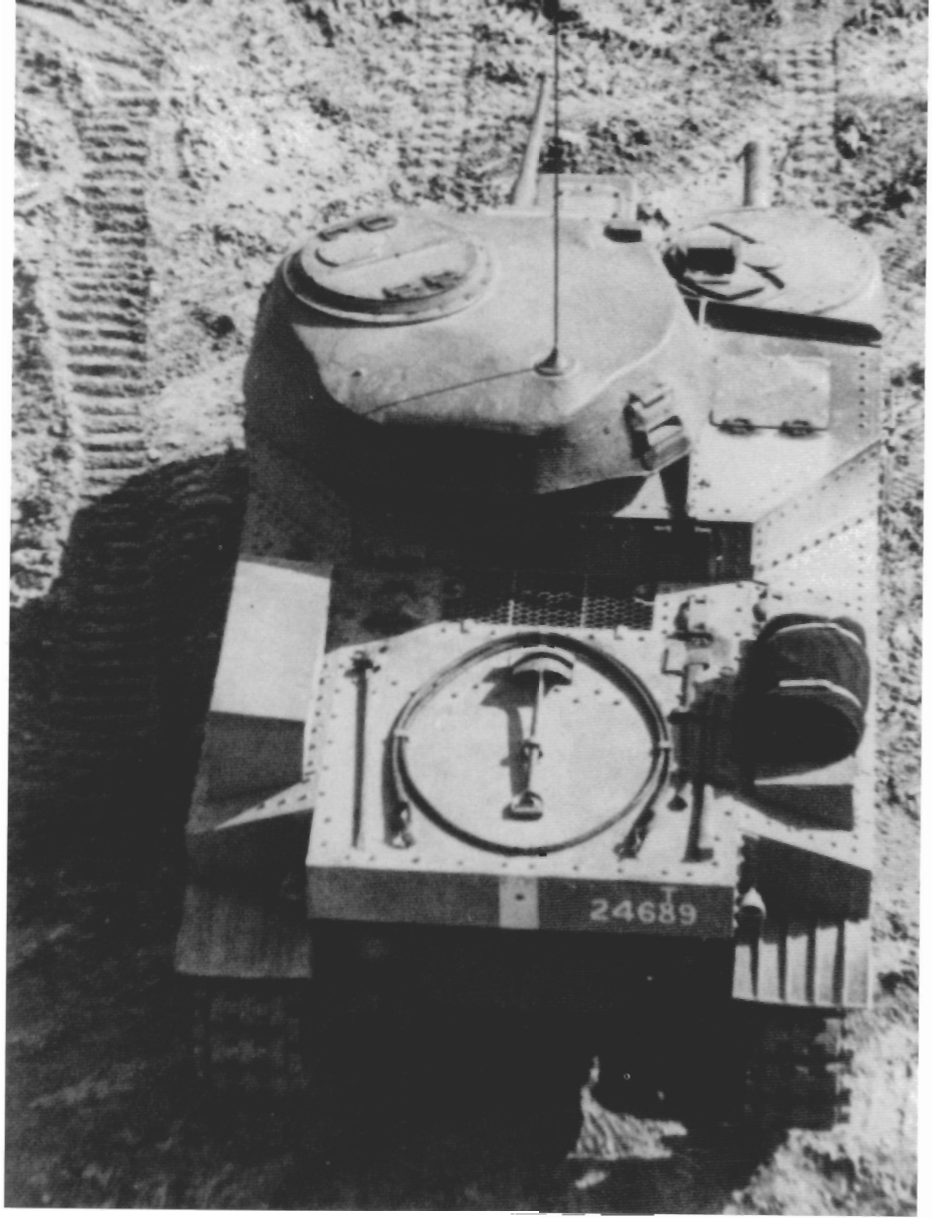
M3 Grant



In addition to a lower, wider 37MM gun turret, the commandsrs cupola was also deleted, which helped to reduce the overall height even more. Since the tank was also slated for use in the North African desert, sand skirts were also added. The shape of these differed from builder to builder. This Grant one has storage boxes fitted to the rear hull. (Hunnicutt)



Unlike the American M3s, the Grants had diffferent types of storage boxes mounted on the rear fenders. These were not symetrical in size and they also angled inward. The American style storage boxes had vertical sides. (Hunnicutt)

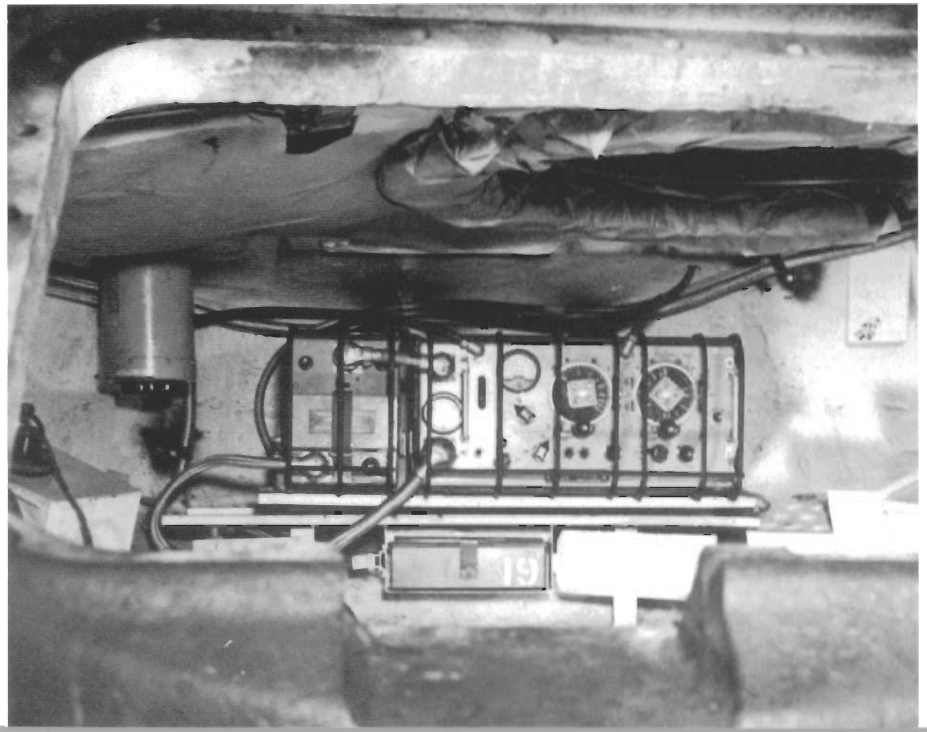


The turret also overlapped the rear deck, nearly over half way across the engine screen. The Grant turret could mount two antennas, one on the right side and the other at the rear of the turret behind the commanders hatch (not installed). (Hunnicutt

(Left) The overall size of the turret (compared to the American version) was much larger. The British one extended out to the left side and nearly touched the loaders hatch on the right side. This turret has not yet had its split hatch covers installed. (Hunnicutt)

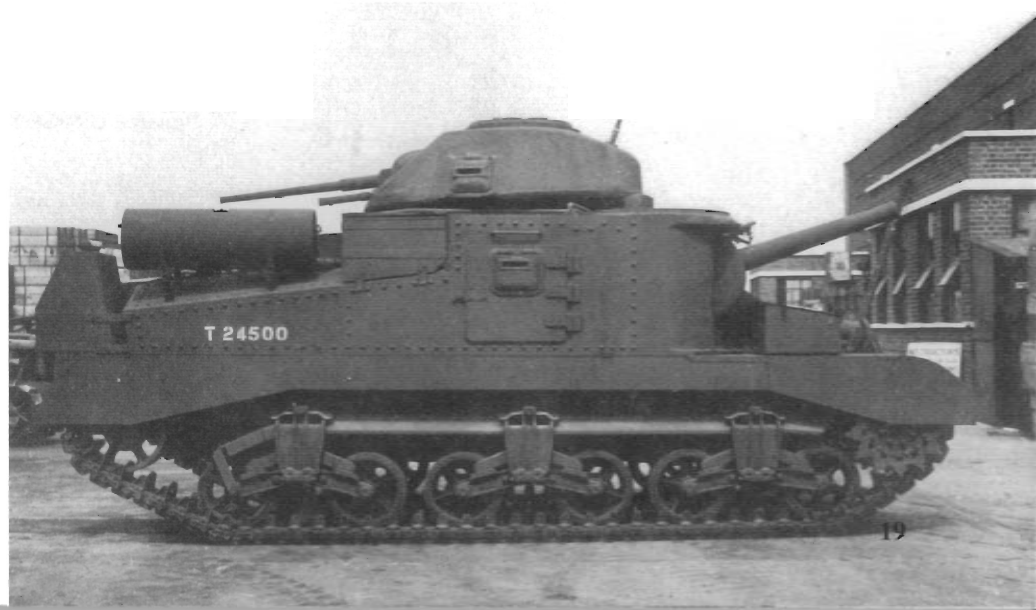
The wide base of the 37MM turret is very evident. It overlapped the turret ring and was much more rounded. Two vision ports were located on the sides of the turret, one toward the left front and the other toward the right rear side. (Hunnicutt)

With the 37MM gun mount removed, the placement of the British #19 radio set is visible at the rear of the turret. The extra room in the turret is very evident in comparison to the U.S. M3. (Hunnicutt)



The British turret had different fittings compared to the U.S. version. The earphones for the radio are visible in the middle, while to the right are holders for smoke grenades. (Hunnicutt)

Later versions of the Grant had mud chutes located on the hull between the bogies to help stop mud build-up. In addition, an auxiliary fuel tank replaced the right storage box at the rear of the vehicle. (Hunnicutt)



As on the M3, the side hatches were eventually eliminated step by step. This M3A1 has the door welded shut and the pistol port plated over. It appears that the star on the turret is White, while the band is Yellow, a color used to various degrees during the early years of the war by armored units for tank markings. (Hunnicutt)

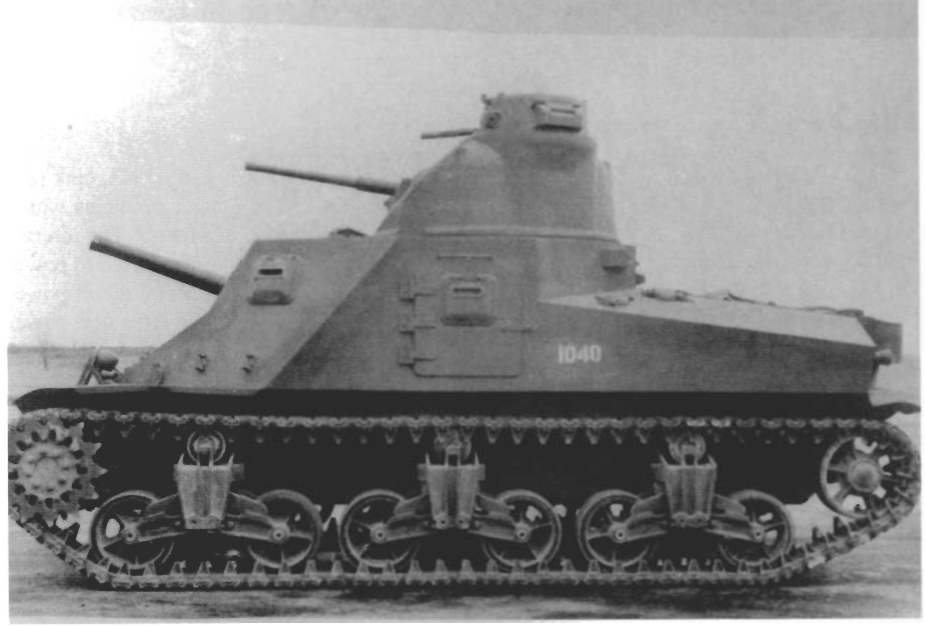
Eventually, the side door was elimated entirely in the later production runs of the M3A1. The hull has a very rough cast finish where the door used to be. (Hunnicutt)

This early production M3A1 had the rear right hatch hinged to open upward. This proved to be very ackward and the hatch was modified on later production vehicles to open downward. This hatch is also at at 45 degree angle inward, due to the curve of the cast hull. (PAM)

M3A2

While the M3 was basically acceptable to the Army, the riveted hull was the source of some concern. As a result, it was decided to produce a welded hull version by the Rock Island Arsenal, which would be fitted with a cast turret. Designated the M3A2, this variant of the Lee was identical to the M3, except for the cast turret and welded hull. The new welded hull; however, offered a number of improvements over the riveted hull. Perhaps the most important was the elimination of the rivets and their hazards. In addition, the welded hull eliminated the chance of machine gun and small arms fragments entering the hull through the riveted joints. The welded hull interior was also smooth due to the elimination of the rivet heads and supports, thus making life easier for the crew from the aspect of bumps and bruises and snagged equipment. Construction was also simplified, leading to a cut down in cost and time needed to manufacture a tank. Welding also lowered the overall weight and in testing was shown to improve ballistic protection and improved hull strength against enemy fire.

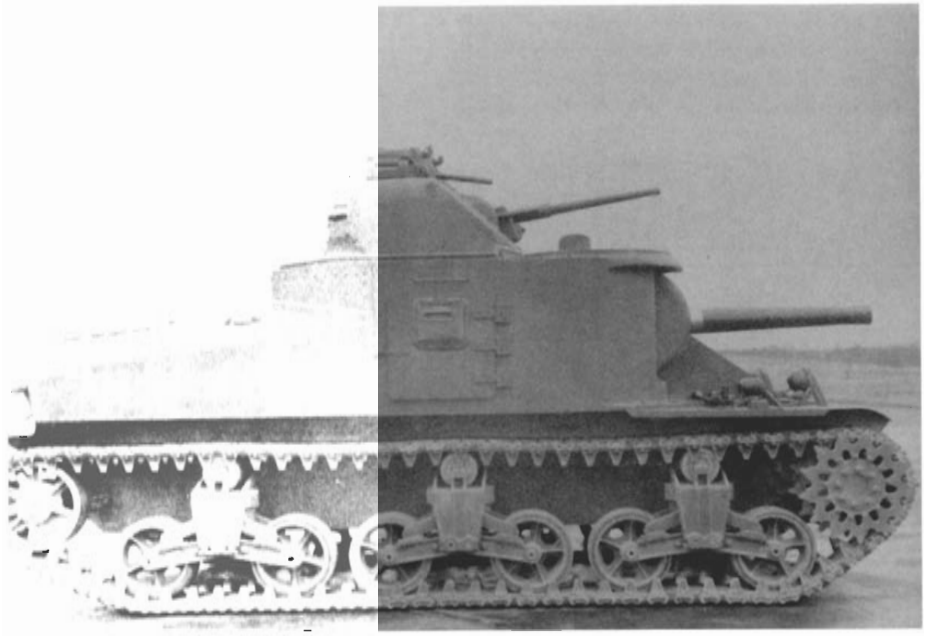
Production of the M3A2 began in January of 1942, at the Baldwin Locomotive Works, but only a dozen vehicles were built before production was switched to the diesel powered M3A3, giving this variant of the Lee the distinction of being the least built.



(Above/Right) The welded hull version did away with the interior angle strips which were used in the riveted version, making for a smoother interior surface, and a reduction in the cost and time needed to produce this model. (PAM)

Aside from the lack of rivets, the M3A2 was identical to the M3. After a production run of twelve M3A2s, production of this model was halted with the vehicle being replaced by a diesel powered version, the M3A3, which used the same basic welded hull. This was the smallest production run of any of the M3 line and the rarest of the series. (PAM)

In a further attempt to eliminate the use of riveted construction, the Rock Island Arsenal producing a welded hull M3 equipped with a cast turret. Designated the M3A2 this version proved to be lighter and had better ballistic resistance. The only rivets used were on the right rear plate behind the 75MM gun. (PAM)



M3A3

As the American industrial base began converting to a war footing in early 1941, tank production was increased dramatically, but problems arose. One of the major problems which affected tank production was insufficient numbers of available power plants. The aircraft industry needed tremendous numbers of the air-cooled radial engines that were used to power the M3. As a result, in August of 1941, a contract was let for an experimental diesel power plant using two General Motors diesel engines mated to an M3 hull. Basically, the new power plant was a combination of tow General Motors G-71 diesel truck engines, which were already coming off the production lines in large numbers.

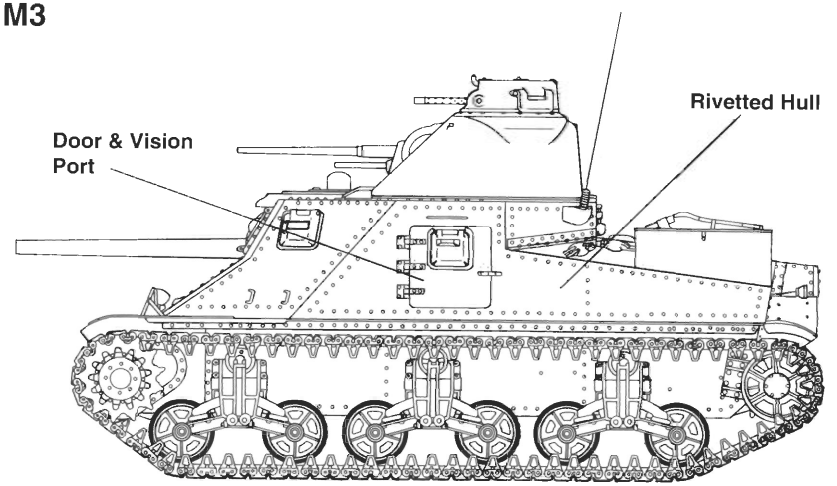
Engineers took the engine blocks which were symmetrical and assembled them with their accessory fittings on opposite sides of each individual block, allowing them to be mounted side-by-side. Each engine could operate independent of the other, in case of battle damage or engine failure, allowing the M3 to keep going on a single engine. Each engine transmitted power via its clutch to a helical gear which meshed with a common collector gear mounted to a propeller shaft. The shaft was connected to a standard M3 transmission.

Due to the large size of this power plant compared to the Wright radial, the engine compartment needed to be modified to accept it. Since it was longer, the lower front of the engine compartment was moved forward a foot into the fighting compartment. Since the diesel required radiators for cooling, these, mounted in the rear needed protection from enemy fire, resulting in the armor plate on the side and rear being extended down to track level and the rear plate sloping down 10 degrees. The twin engine doors of the M3 were replaced with a single plate along with the addition of a dust deflector, which it was hoped, would reduce the effects of the exhaust gases and cooling air. On top of the rear deck, twin armored access doors were added with intake louvers above the engines. While all of these modifications raised the weight of this variant by approximately one ton, the better fuel consumption of the diesel engine resulted in increased range, even though the fuel capacity was cut from 175 gallons to 148 gallons. Handling in the lower speed ranges also improved and the diesel engines also offered better protection from fire hazards under combat conditions.

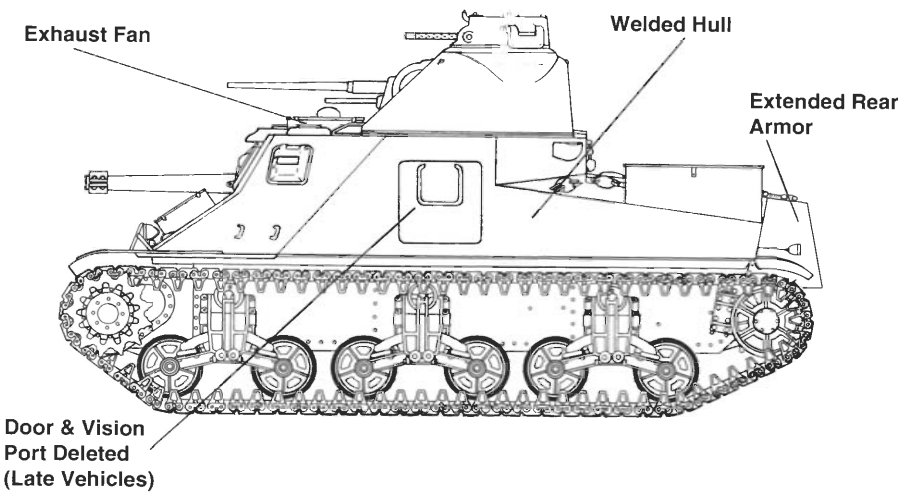
The external appearance of the M3A3 differed little from that of the M3. The initial model was a riveted hull M3, which had the air-cooled radial replaced by a pair of General Motors diesel power plants. From this angle, there is no visible difference between the two vehicles. (Hunnicutt)

Designated the M3A3, the new General Motors 6046 was initially intended for installation in only welded hulled vehicles. The increased need for new tanks; however, resulted in this power plant being installed in riveted hulled vehicles under the designation M3A5. Production of the M3A3 took place at the Baldwin Locomotive Works, where 322 of the tanks were turned out between January and December of 1942.

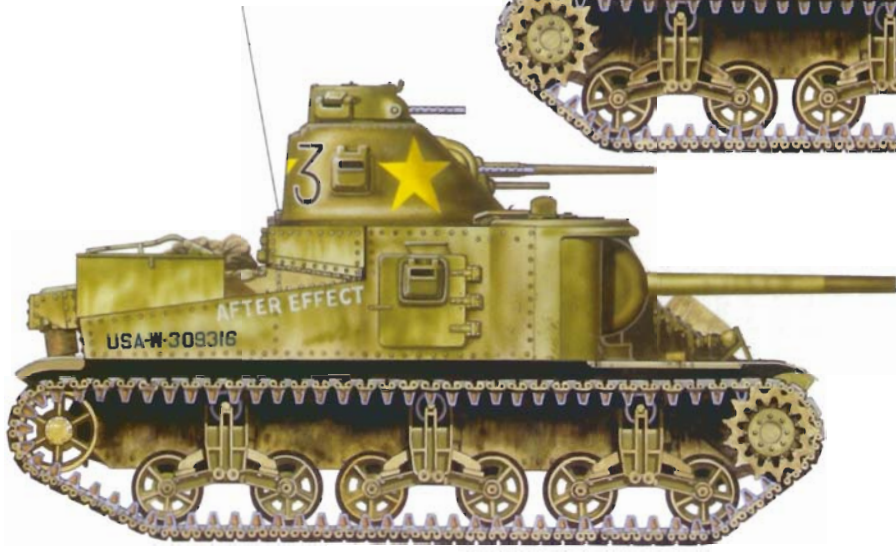
M3



M3A3

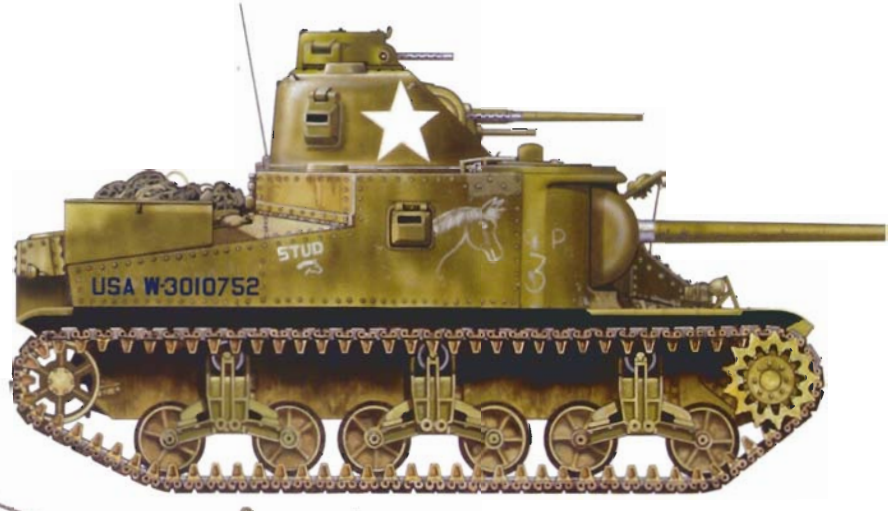


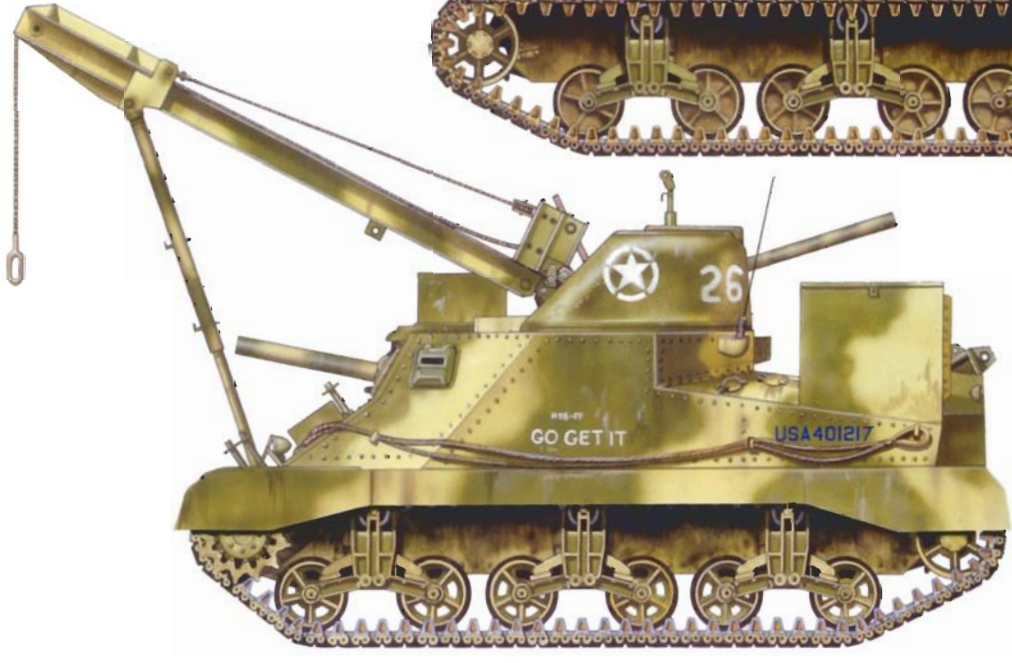
A M3A1 of the Armored Force School, Fort Knox, Kentucky during 1942



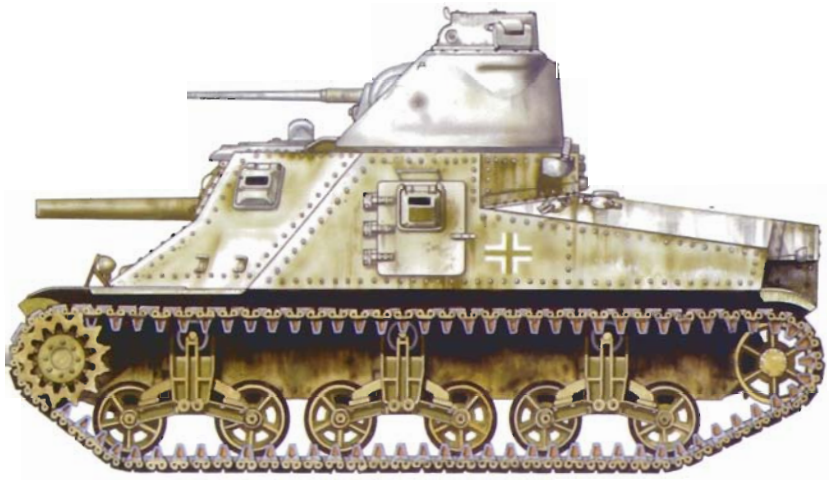
AFTER EFFECT was a M3 of the 1st Armored Division, 13th Armored Regiment at Bizete, Tunisia during May of 1943.

A M3 Lee of the 1st Armored Division stationed in Northern Ireland during 1942.





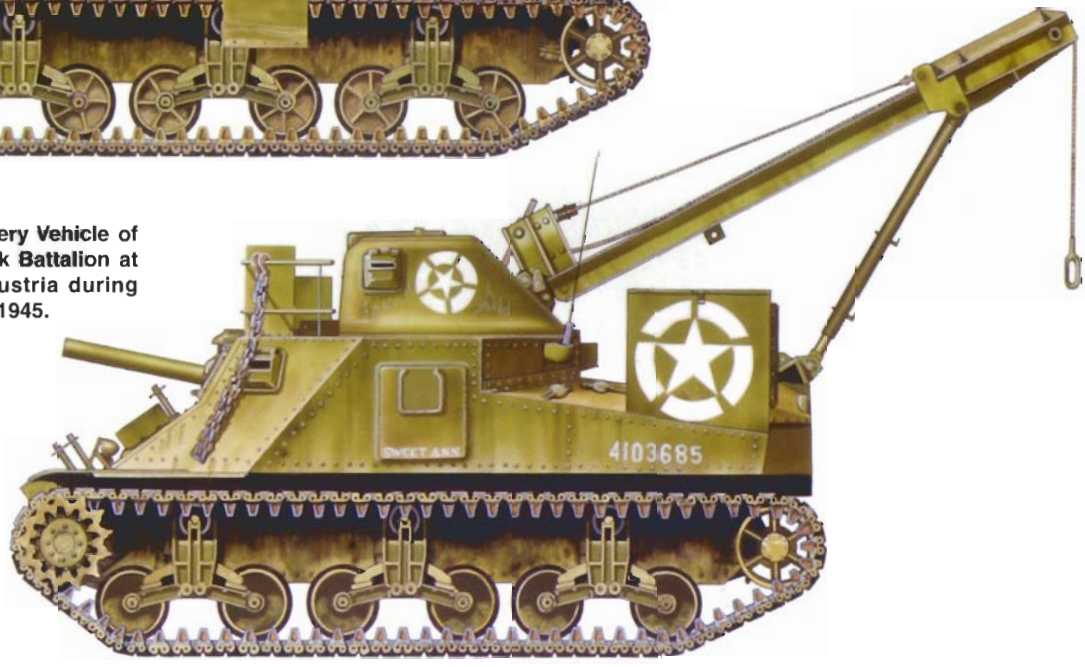
This M31 took part in the invasion of Sicily during July of 1943.



This M3 was captured from the Russians at Mzensk, during February of 1943, and placed into German service.

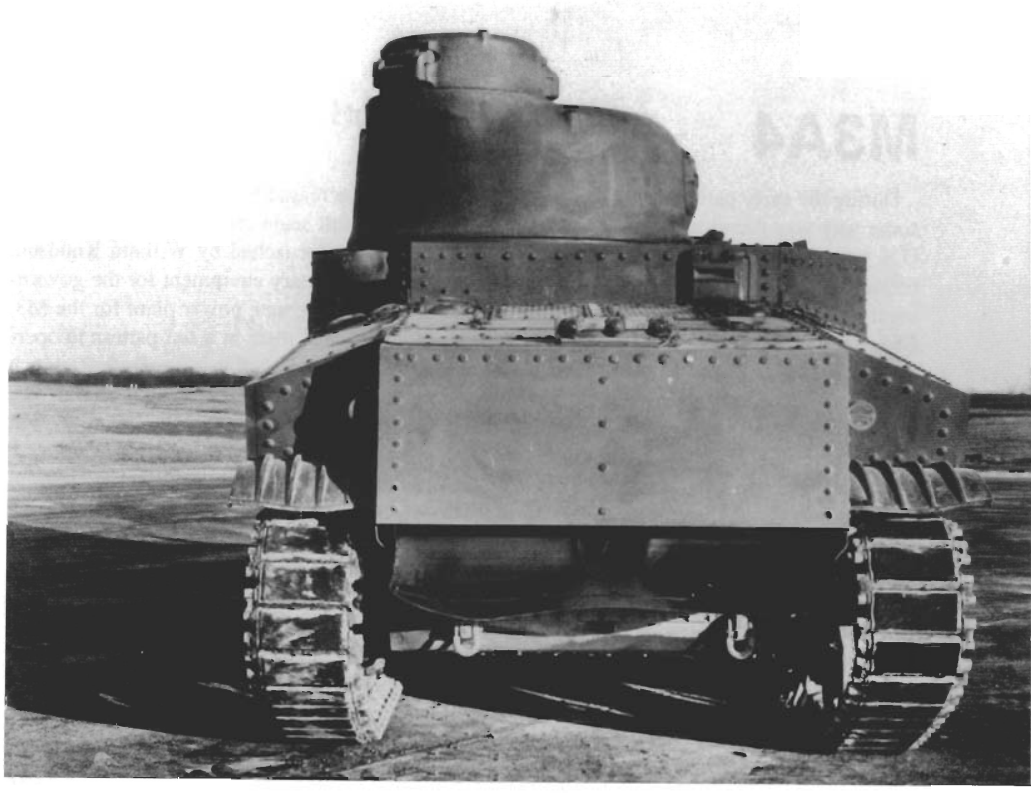
This Grant Mk I of the Straffordshire Yeomanry, C Squadron, 8th Armored Brigade, 10th Armored Division, 8th Army saw service at El Alamein.

COSSACK was a Lee of C Squadron, 150th Regiment, Royal Armored Corps at Mandalay, during March of 1945.



A M31 Recovery Vehicle of the 191st Tank Battalion at Innsbruck, Austria during the Spring of 1945.

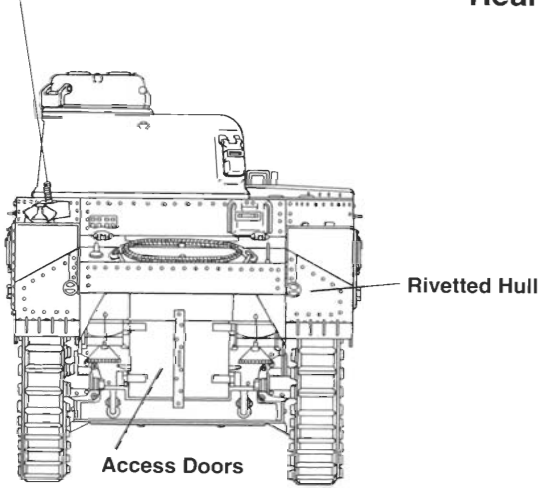
At the rear of the M3A3, the side and rear armor plate was extended downward to the track level to protect the engine radiators needed to cool the diesel engines. The rear plate was sloped at an angle of ten degrees. This vehicle was the first converted and was at Aberdeen Proving Grounds during November of 1941. (Hunnicutt)



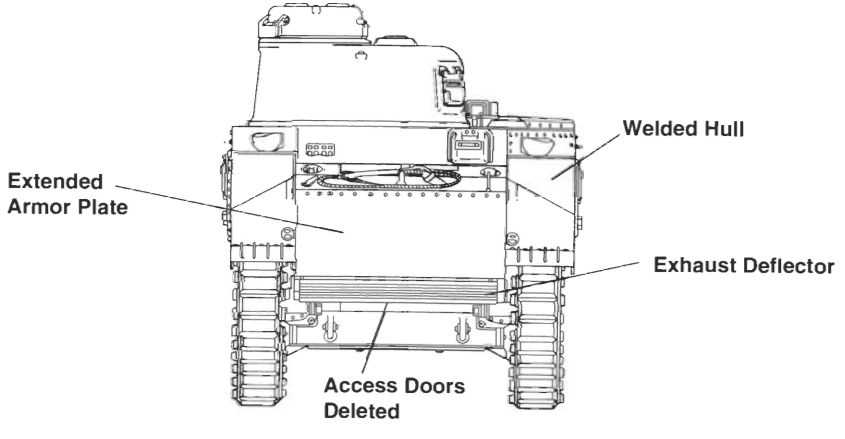
The rear twin doors of the M3 were replaced by a single plate, access to the engine being gained through two doors on top of the engine deck just behind the fighting compartment. In addition, an exhaust deflector was added to help reduce the dust stirred up by the exhaust and cooling air coming out of the compartment. Eventually, the designation M3A3 was used for welded hull variants only, while those with rivetted hulls were designated M3A5. (Hunnicutt)

Rear Hull Development

M3



M3A3



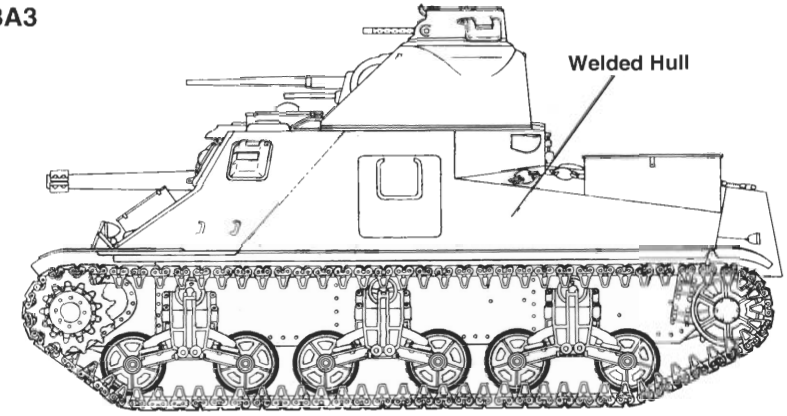
M3A5

When the new twin diesel General Motors 6046 was accepted as a power plant for the M3A3, it was decided to use this engine in welded hull models of the M3 only. As the need for more tanks increased; however, it was decided to also use this power plant in riveted hull vehicles in order to increase production. Tanks so equipped were designated M3A5 and aside from the riveted hull were identical to the M3A3. Approximately 591 M3A5s were eventualy produced at the Baldwin Locomotive Works from January to December of 1942.

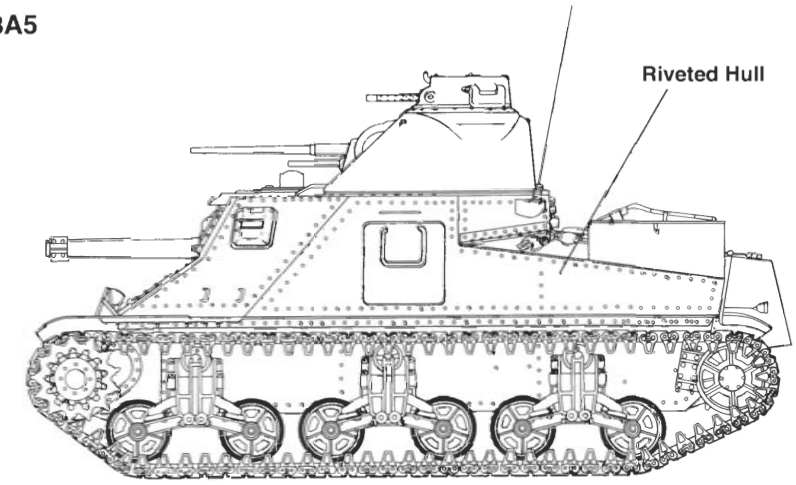
In British service, the M3A5 was referred to as the Grant II. Out of the total number produced, 185 were supplied to the British along with forty-nine M3A3s. Some, perhaps all, were fitted with the British turret and saw action in North Africa and Italy, mostly as command of flail tanks, and for training duties in Australia.

Hull Development

M3A3

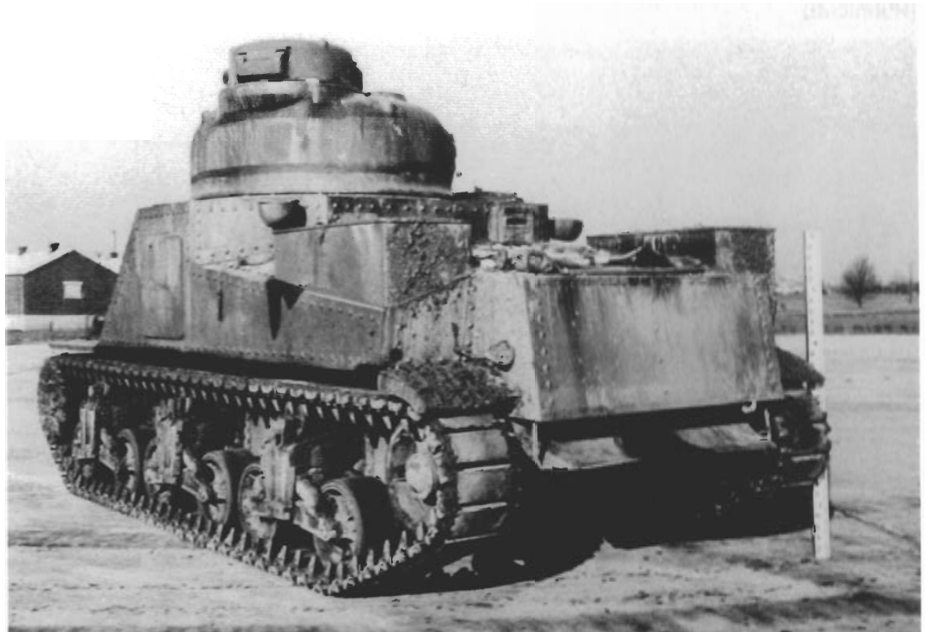


M3A5



The only difference between the M3A3 and the M3A5 was in the method of hull construction. The M3A3 was welded, while the M3A5 was riveted. This M3A5 was undergoing acceptance trials at Aberdeen Proving Grounds during December of 1942. The side doors have been welded shut and the 75MM gun has a counterweight on the barrel. (Hunnicutt)

The all riveted construction of the M3A5s is quite evident from the rear. The two exhaust defectors are visible just below the back armor plate. (Hunnicutt)



This M3A5 was used to test hydramatic transmissions at Aberdeen Proving Grounds. The results of these tests were very encouraging. The new transmission gave the vehicle a better ride, improved driver comfort, made for a more stable firing platform and improved acceleration. The wheel attached to the rear desk was to check performance. (Hunnicutt)

This M3A5 has been fitted with ventilators, since it was found that in combat there was a build-up of cabon monoxice levels to dangerous concentrations when the tank was buttoned up. The welded shut door without a pistol port was a feature of late versions of the M3. (Hunnicutt)

M31

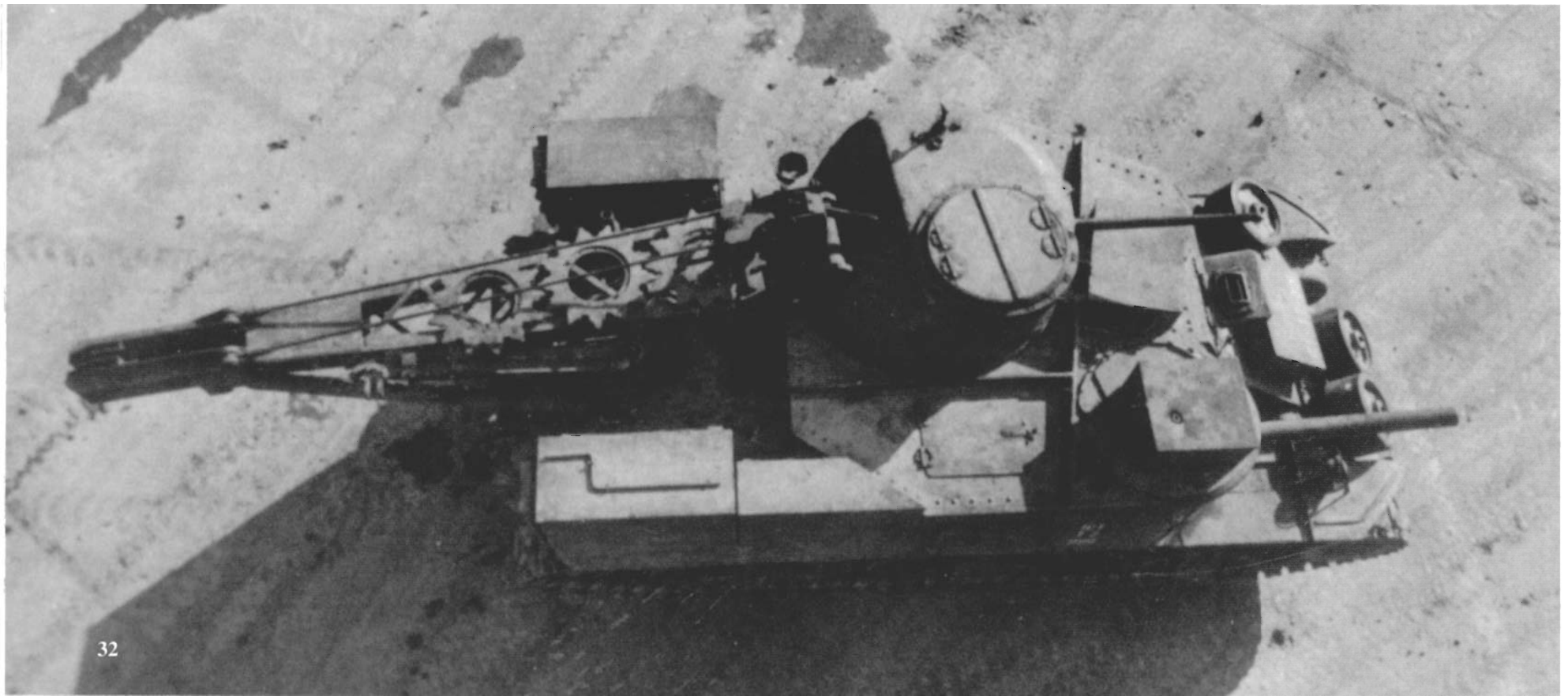
Early in the war, the Germans realized the value of recovering damaged and disabled tanks from the battlefield using a variety of vehicles. The U.S. began looking for such vehicles and in early 1942 thought was given to converting the M3 into a tank recovery vehicle. By the Fall of 1942, with large numbers of M4 Shermans becoming available, enough M3s were able to be released for conversion to a recovery vehicle under the designation T2. The M3 was stripped of its 37MM and 75MM guns and a Gar Wood Model 10-Y5500 crane was fitted on a special plate where the 37MM gun mount had been. To give the illusion that the vehicle was still armed, a dummy gun was fitted to the back of the turret and another was installed on the door which gave access through the former 75MM gun mount into the interior.

The crane had a capacity of five tons by itself, but if special telescoping legs were used to stabilize the crane, this capacity was tripled. These telescoping legs could also be fitted to the rear hull at the extreme end of the engine deck. In the crew compartment, there was a winch with a capacity of 60,000 pounds. It was a jaw clutch type, which could be threaded over rollers on the floor to go out of the hull either toward the front or rear. It could also be used through the turret to the boom. Since it served no purpose, the turret basket of the 37MM gun was removed to provide more room and easier access to equipment.

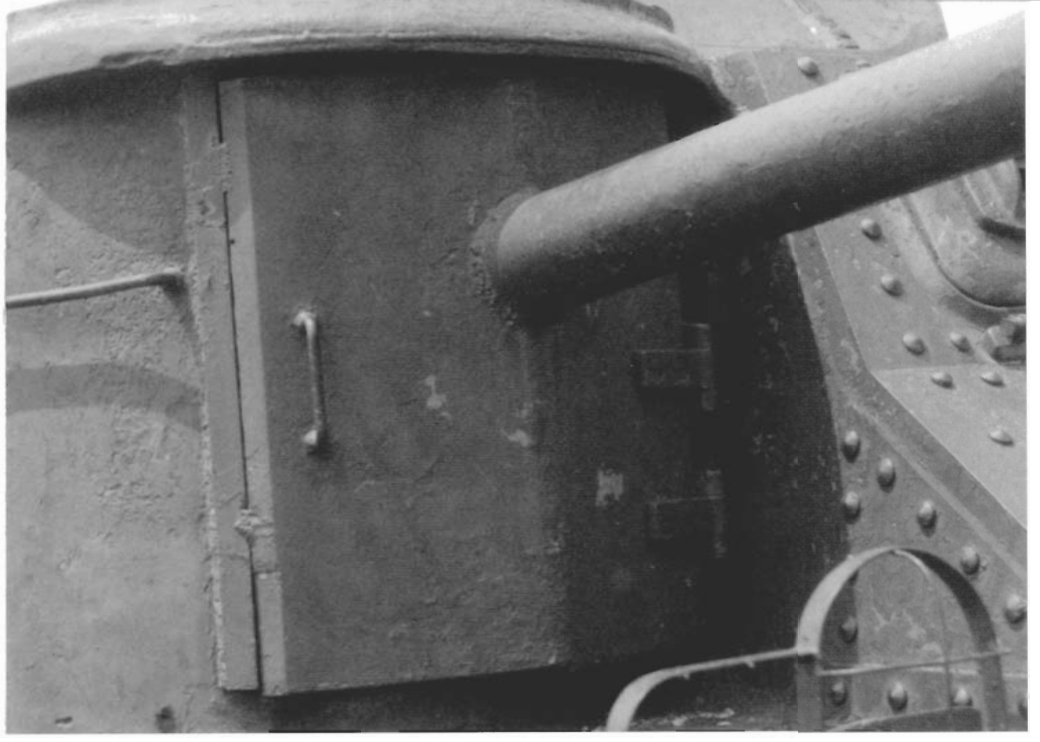
For self-defense, a single .30 caliber machine gun in the fixed mount next to the driver was retained. Provision was also made to mount one in the turret ring using a British type mount. Additional storage boxes were also added to the top of the hull over the former 75MM gun position, in front of the 37MM turret and just below the driver's hatch. The storage boxes on the rear deck were also nearly doubled in size by extending upward above the deck of the fighting compartment.

While initially, it was planned to convert 750 M3s to the T2, later redesignated M31, a shortage of this model resulted in M3A3s and M3A5s being used in its place. The only difference, aside for the diesel engine, was that the power take-off was modified due to the engine. On the M3 this had been in the rear, while on the diesel variants, it was located in the front. Conversion was carried out by Baldwin Locomotive Works, starting in October of 1942 and running until the war's end, with at total of 805 being produced. These included 509, using the M3 chassis and 296 based on either the M3A3 or M3A5. These were designated respectively the M31, M31B1 and M31B2.

The crane mounted on the M31 had a maximum capacity of 30,000 pounds, while the winch could pull upwards 60,000 pounds. Additional storage boxes were mounted on the front hull, top of the fighting compartment, and the rear deck. In addition, the rear boxes were also raised in height to accommodate more equipment. For self defense, the M31 could carry a .30 caliber machine gun on a British type mount on the turret ring. In addition, the driver's fixed .30 caliber gun was retained. (PAM)



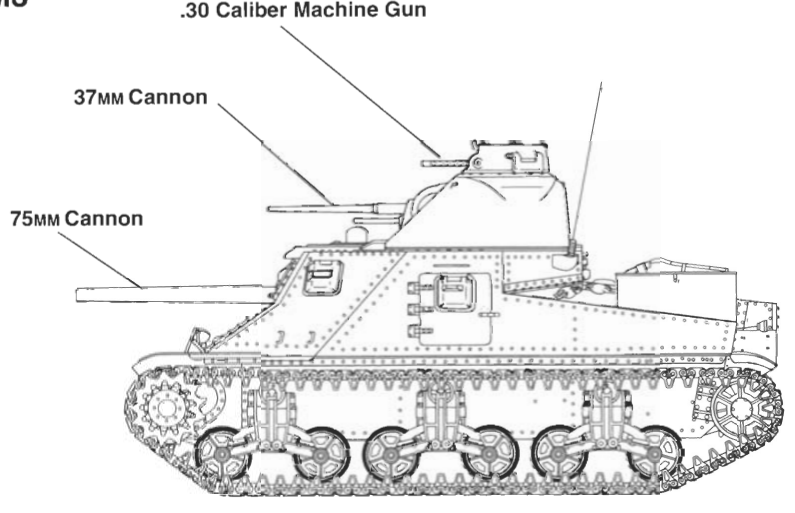
The boom assembly could be carried in a stowed position during travel. These were adjustable by means of pins. Maximum lift capacity could be achieved by placing the booms on the ground. (USA)



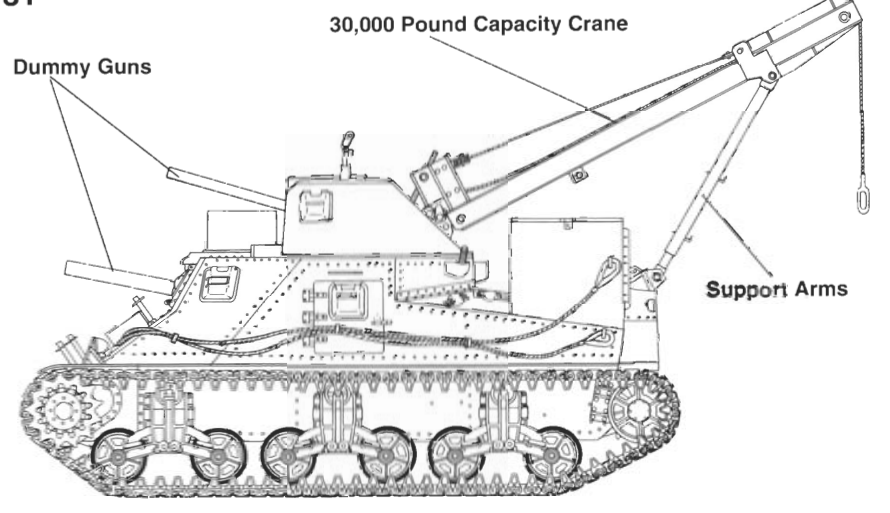
The housing for the 75MM gun was replaced with a large door to provide easy access to the interior. The pipe used to simulate the 75MM cannon was so fitted that it did not interfere with any obstructions when the door was opened. (Author)

The M31 was an attempt to convert the M3 into an armored tank recovery vehicle. The basic conversion involved replacing the turret mounted 37MM cannon with a crane. A fake gun tube was mounted on the back of the turret to simulate the 37MM gun, the turret normally being traversed toward the rear where the crane supports were located. The 75MM cannon was also removed and replaced with a fake gun tube. (PAM)

M3



M31



M3 CDL

One of the most unusual and little known variants of the M3 was the Canal Defense Light (CDL) modification. This modification involved fitting a heavy searchlight on the chassis of an infantry tank for battlefield illumination. Following its initial installation on a Matilda, British designers decided that the M3 would be far better suited for use in this role. This was due to the fact that the searchlight turret could be mounted in place of the 37MM gun, while the tank could retain its 75MM gun.

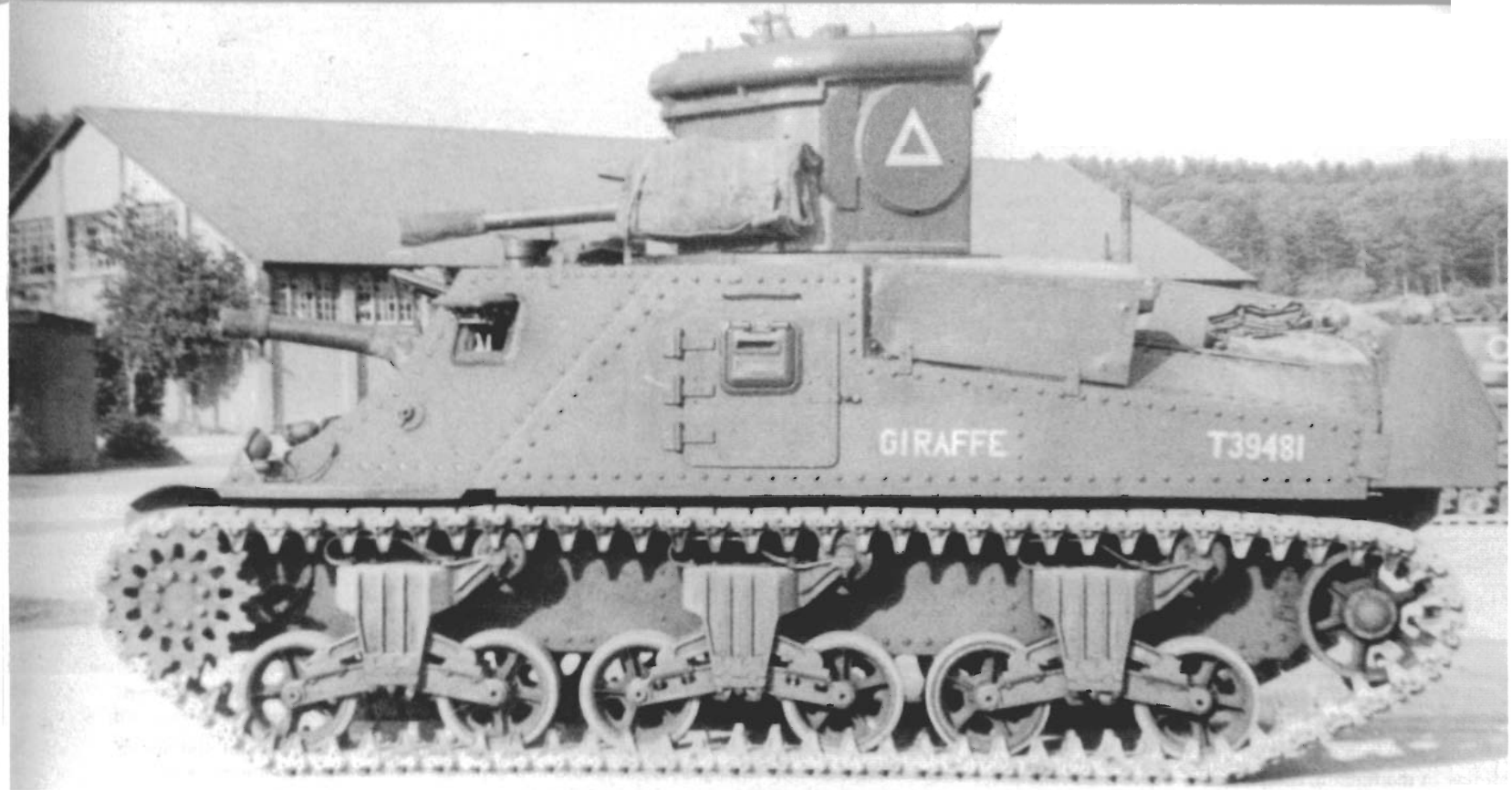
After the U.S. entered the war, American officers were shown a demonstration of the CDL. The original name had been selected for security reasons and the U.S. officers, after deciding to adopt the CDL tank, also decided that security for the program was of paramount importance. To maintain this, the training program was code named CASSOCK and the tanks were referred to as LEAFLETS.

The searchlight turret was made of cast steel sides, 2.55 inches thick with rolled steel plates bolted on the top. It was divided into two sections, separated by an armored bulkhead, with the searchlight on the right side and the operator on the left, who operated either a 7.92MM Besa or .30 caliber Browning machine gun in the British and American variants respectively. The original searchlight was a high intensity carbon arc lamp which produced a 13,000,000 candle power beam. This beam was directed through a two foot by 2 3/8 inch wide vertical slot, which had an internally mounted armor plate shutter. Colored filters could also be used with the light and at 1,000 yards, the searchlight produced a beam 340 yards wide by thirty-five yards high. After initial trails with six turrets provided by the British, the U.S. Army selected an arc light then in production by the Mole-Richardson Company which proved to be more rugged and less susceptible to dirt and dust in the air. Power for the light was provided by a 10 kilowatt DC generator and regulator, which was driven by a power take-off from the engine. This was located in the left rear of the fighting compartment, where the 37MM turret basket had been. After receiving the set of six turrets, plans were made in the U.S. to reconfigure the M3s into CDL version. The American Locomotive Company was given the contract for this project which was designated the Shop Tractor T10 for security reasons. The components were delivered to the Rock Island Arsenal where they were assembled under strict security. Between June of 1943 and the end of 1944, 497 CDL tanks were converted, using both M3 and M3A1 chassis. These were fitted with the rotor shields to the 75MM gun, in anticipation that the tanks would draw large amounts of small arms fire when employed.

Unfortunately, despite the time and effort put into the program, the CDLs were used only on a few occasions. The Americans organized two armored groups and the British formed two tank brigades to deploy the CDLs. The veil of security which had surrounded the project severely hindered the use of the CDLs for the very simple reason that hardly anyone was aware of them or how they could be employed. Following D-Day, there were a few occasions for their employment due to the scope and speed of the Normandy breakout, which also made it nearly impossible for the field commanders to see an exercise on how to use them. In addition, the heavy losses in tank crews led to several units being converted back to regular tank formations, with the CDL equipment being put into storage. Eventually, they were employed in defensive missions for covering the bridges across the Rhine, especially at Ramagen in the Spring of 1945. Some crews and equipment were also shipped to India and Okinawa in the Pacific but arrived to late too see combat. With the end of the war, interest in the CDL program waned and the project was dropped, until revived during the Korean War.

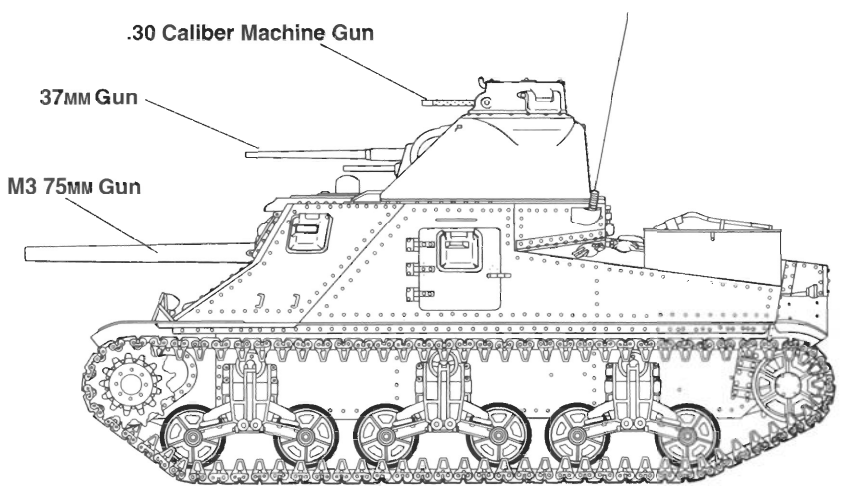
The British came up with the idea to mount a high powered searchlight on a tank for use on battlefield. After looking at a number of vehicles it was decided to utilize the M3 Grant, since the main armament, due to its being mounted in the hull, could be retained while the searchlight could be mounted in place of the 37MM gun. Aside from the unusual shape of the turret, the overall configuration of the M3 was not substantially altered. (Hunnicutt)

The beam of light from the searchlight was exposed through the narrow slot just above the driver's hatch. The light was mounted in a separate compartment to the left while the operator, to the right side, also handled the machine gun which could be used for defense or for ranging if tracers were used. (Hunnicutt)

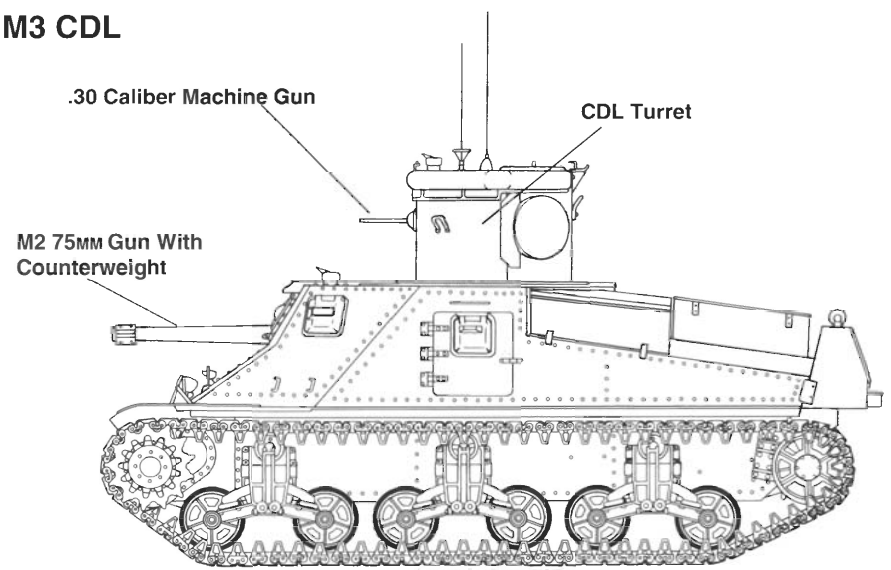


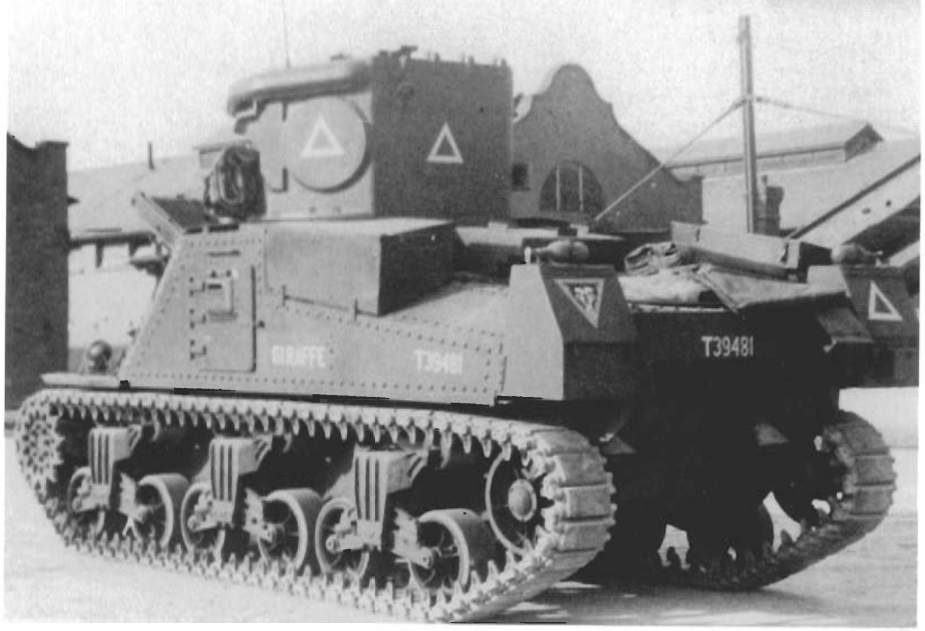
Initial British turrets had a door with a pistol port, but these were later replaced with welded on armor plate. This CDL was assigned to the British 79th Armored Division which pioneered the use of specialized vehicles on a large scale. The 37MM gun was replaced by a BESA machine gun operated by the search light operator in the left side of the turret, the search light occupied the right side of the turret. (Hunnicutt)

M3



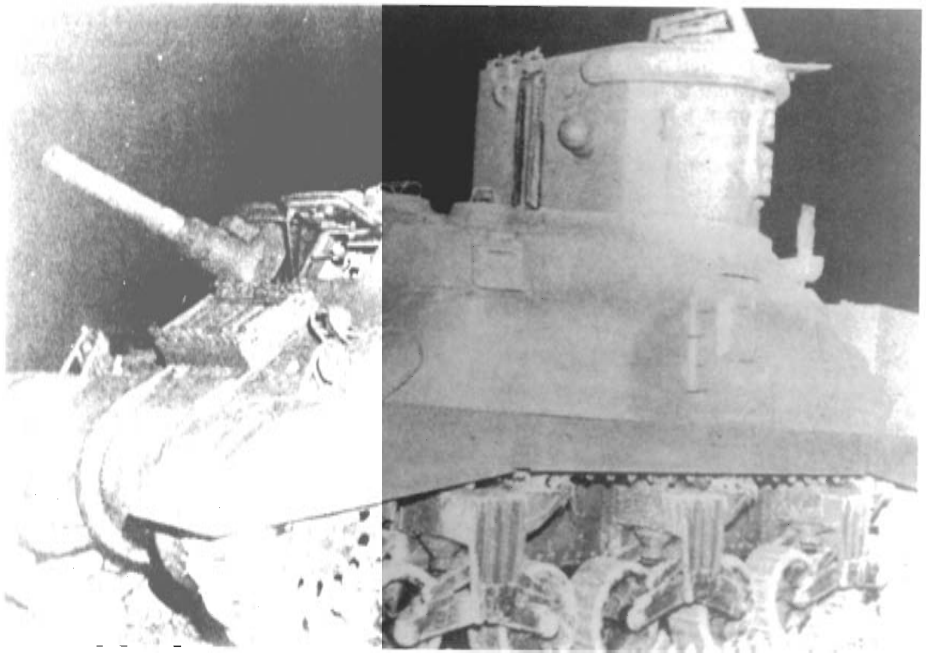
M3 CDL





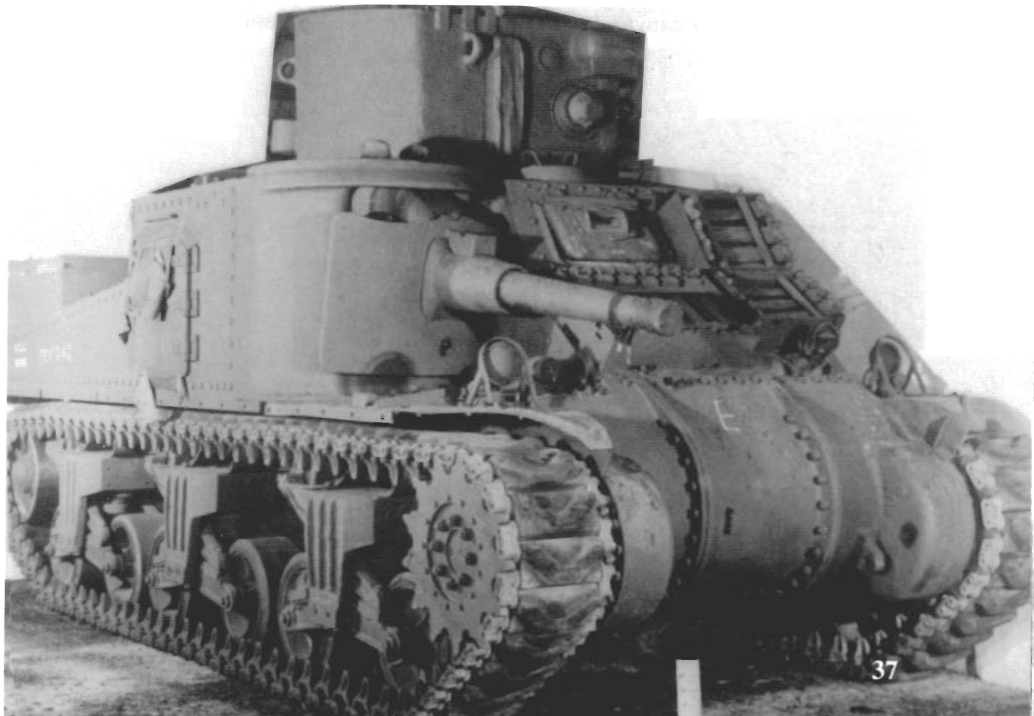
Minor changes were made to the hull in the way of storage boxes and axillary gear, but aside from the searchlight turret and its associated gear the basic vehicle stayed the same. The insignia for the 79th Armored Division is visible on the storage box located on top the left fender. (Hunnicutt)

A postwar M3A1 CDL was used for testing. While the concept of the CDL tank .proved viable, the high cost of the turret and light later made it more economical to use a regular searchlight, as later tests were to show. Eventually American tanks used such searchlights in both the Korean and Vietnam War with good results. (PAM)



This M3 has had the auxiliary shield added to the gun barrel for additional protection. Despite a large outlay of time, men, and material, the CDL program never reached its full potential. Eventually most of the units converted to regular tank units and the CDL equipment was only used on a limited basis late in the war. (PAM)

The U.S. version of the CDL turret varied only in minor details. This CDL was based on the chassis of the M3A1 cast hull Lee. In U.S. service both the M3 and M3A1 were used for the CDL conversion. (PAM)



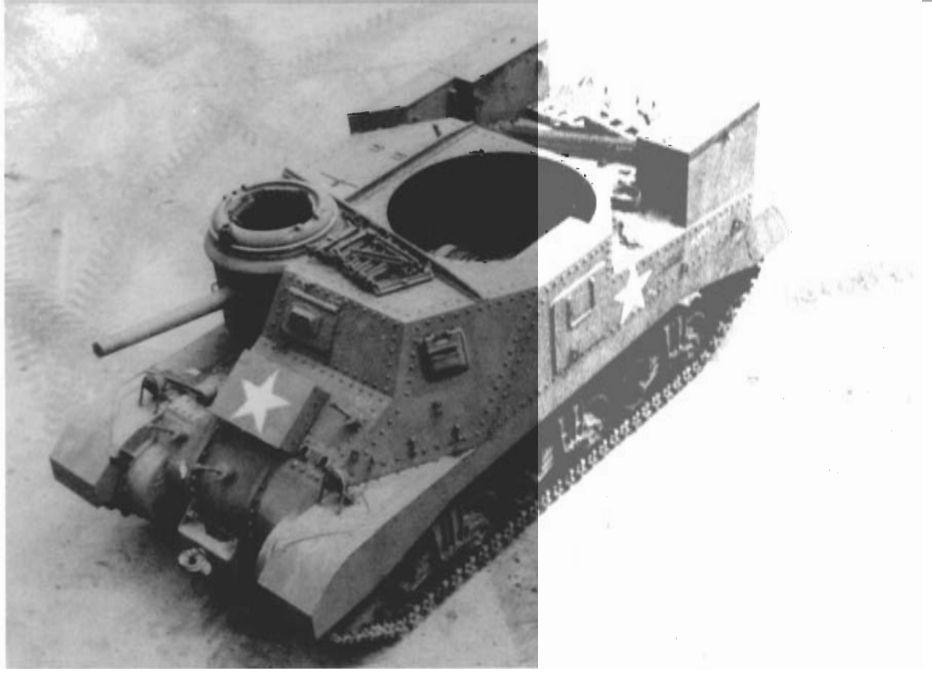
Other Variants

The M3 series was also used in a variety of other projects, but most never went beyond the prototype stage. They did; however, provide information which was used in certain conversions applied to the M4 Sherman.

Initially, in early 1942, some thought was given to developing a heavy duty tractor based on the M3. Designated the T16, this design traced its lineage partially back to the Heavy Tractor T2, based on the M2A1, which proved to be under powered and unreliable. Using the M3A5 as a starting point, a prime mover was developed, but the T16 lacked adequate storage space and was dropped in favor of other designs.

Another M3 version, which did see limited service as an artillery prime mover, was the M33 Prime Mover. The Chester Tank Depot converted 133 M31s by removing all recovery gear, the 37MM turret and all machine guns. They were fitted with a compressor to provide the needed high pressure air to operate the brake system of the towed artillery.

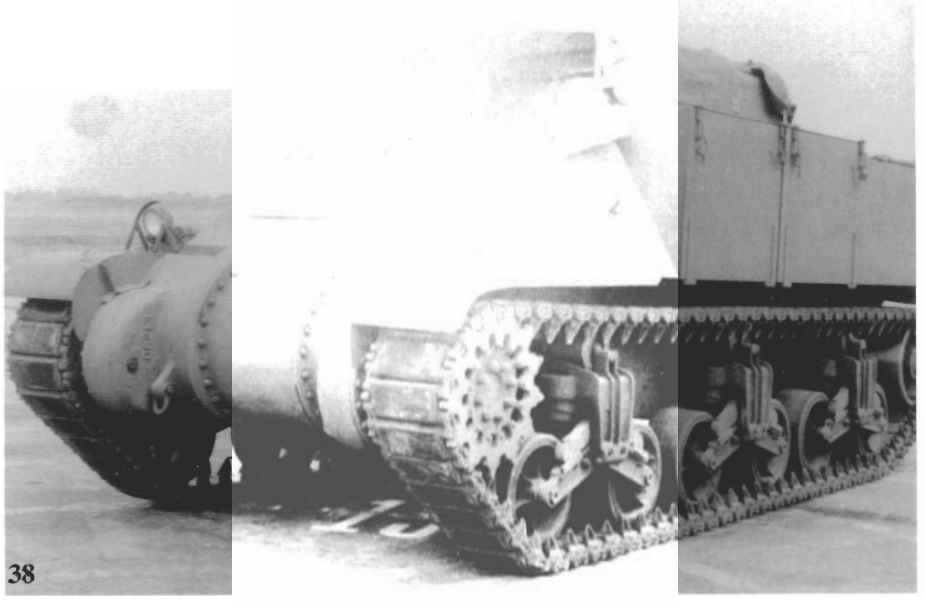
A number of weapons of different size were also test fitted to the M3 in an open topped arrangement. Two different types of 3 inch guns were tested under the designation T24 and T409 for use as tank destroyers. The T24 proved to have too high a silhouette, but the T40 showed promise and was standardized as the M9. Objections from the Tank Destroyer Board; however, about its speed and mobility, plus a shortage of 3 inch guns, led to it being dropped. More successful was the mounting of a 105MM cannon on an M3 chassis under the designation T32. Testing resulted in several modifications, with the vehicle eventually being standardized as the M7 Priest. It was widespread use and as the M4 replaced the Lee on the production line, the M7 was updated with M4 components, eventually resulting in a separate designation, the M7B1.



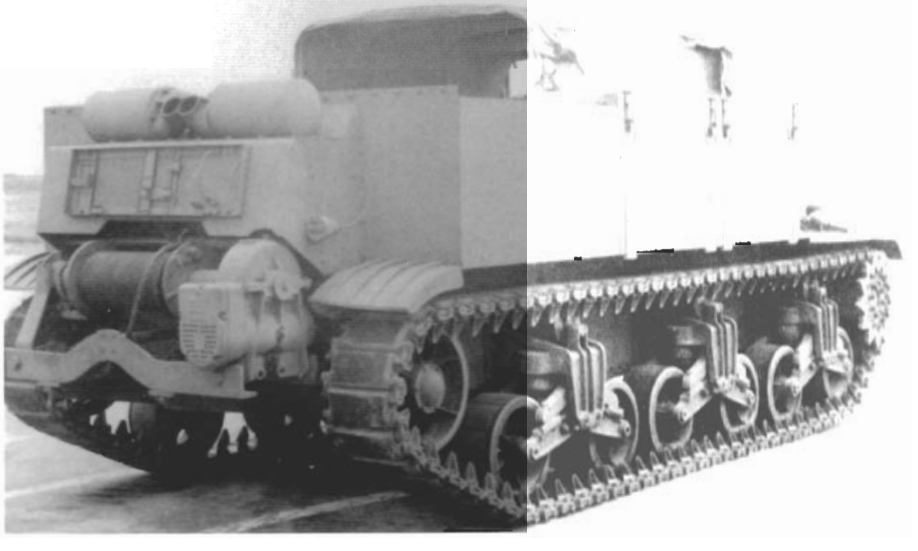
Due to a shortage of prime movers in late 1943, it was decided to convert a number of M31s to this role under the designation M33. The turret was removed along with all machine guns, although a ring mount was added, A compressor was added to provide air for the braking system. (PAM)

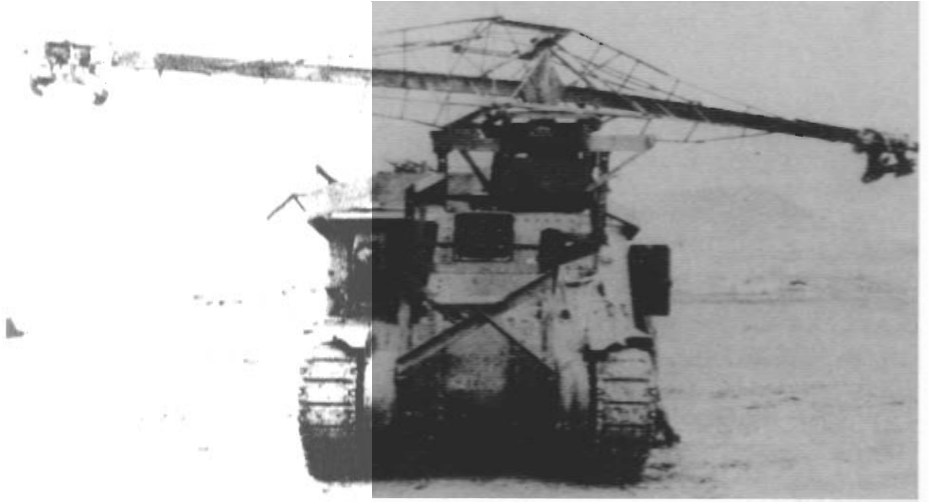
The M3 was also used to test ways to clear mines. The first such device was designed in North Africa using a rotating boom which positioned a explosive charge over a minefield. When the charge was exploded, the shock wave, in theory, would detonate the mines. Although it showed promise, the rig on top of the M3 which had its 75MM gun and 37MM tur-

The T16 was an attempt to use the M3 as a heavy tractor. Based on the M3A5, it was found that the vehicle did not have enough storage space.. There was no overhead cover except for the canvas cover rigged to provide some shelter from the weather. (PAM)



The rear of the T16 had a 40,000 pound Gar Wood winch and its equipment. Due to this arrangement, the rear of the hull and exhaust system were drastically altered. (PAM)



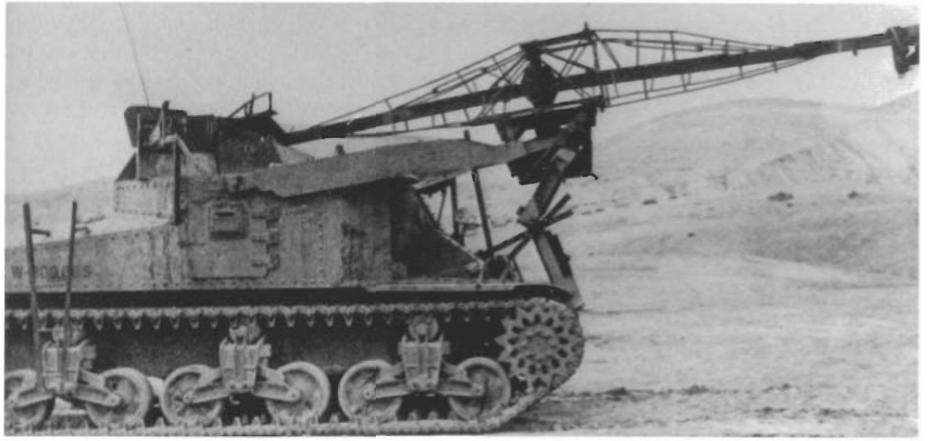


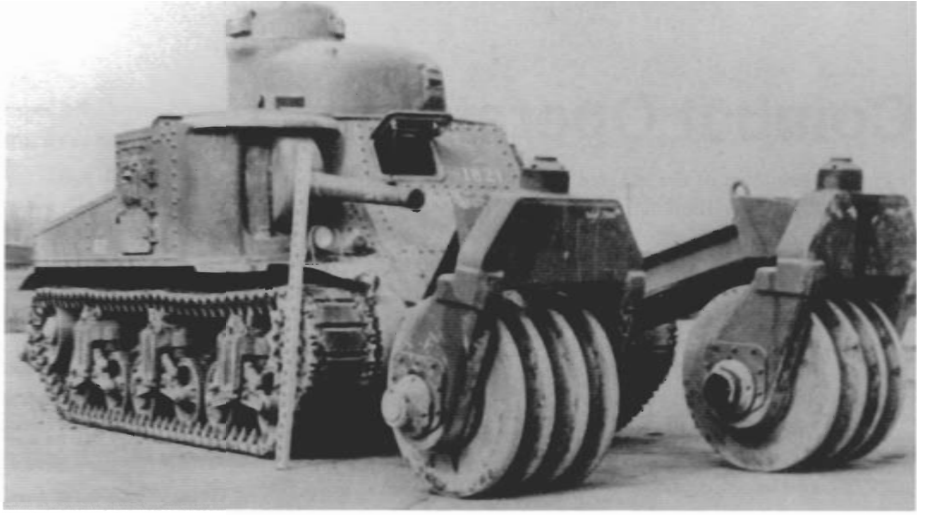
A special mine clearance vehicle was developed by the Fifth Army Engineer Training Center to clear fields using a shaped charge set to explode above the mines. The boom held the charge and rotated to place it about twelve feet ahead of the tank. (PAM)

ret removed, malfunctioned and was unable to be repaired in the field. It did lead to a further interest back in the U.S., where a M4 was used in place of the M3. The M3 was also used to test a mine clearance device using a set of steel disks which were pushed in front of the tank. These rollers, designated T1, were mounted in front of each tread on a set of beams. Another one was towed behind the vehicle to clear the center path of the land for full coverage. While tests showed the feasibility of the concept, improvements were made in the design and the new model, the T1E1. was mounted on the M32. Eventually, this project culminated in the devices being used in combat on M4 Shermans, although their poor mobility was to be their biggest handicap.

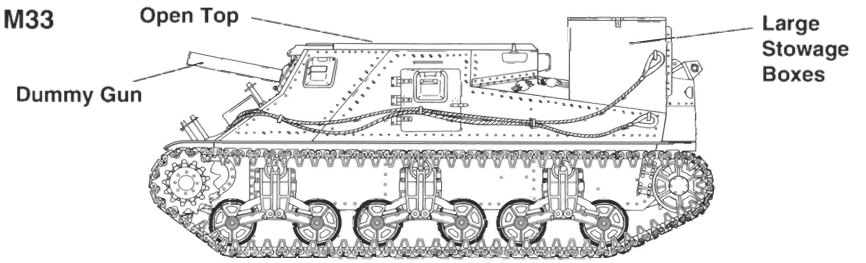
(Right) In addition to the front rollers, another set was towed behind the tank to clear a lane between the front lanes. The biggest problem with the unit was its weight. It was easy for the vehicle to bog down (bottom) on soft ground. In addition they were very unwieldy. (PAM)

To set off the charge, it was lowered toward the ground until a trigger was pulled at approximately six feet above the ground. About 170 charges were carried, enough to clear a lane 1,000 feet by eighteen feet. The vehicle did not see combat. (PAM)





This M3 was used to test the concept of mine rollers. These disks were pushed ahead of the tank to set off mines. Each roller was forty inches across and made of steel. All armament was removed from the M3 (PAM)



Combat Operations

The combat debut of the M3 took place in North Africa in May of 1942 during the battle for the Gazala Line. Following their retreat from Cyrenaica during Rommel's winter counter-offensive, the British established a strong line anchored at Gazala in the North and Bir Hachem to the south. By the Spring both sides had built up strength, with the British as usual having the material edge. Among their reinforcements were 167 Grants, which were divided between the 1st and 7th Armored Divisions. These Grants gave the British a decided edge and were superior to any German or Italian armor then in the desert except for the long barreled Pz IV, which mounted an excellent 75MM cannon. These; however, were so few in number as to be inconsequential.

With the Grant, the British finally had a tank which out-ranged the Pz III with its 50MM gun and the Pz IV with the short barreled 75MM gun. In addition, the Grant could fire high explosive rounds, which would prove to be extremely useful in suppressing German anti-tank guns which Rommel used to draw British armor into killing zones while using his panzers as maneuver elements.

Interestingly, an effective anti-tank round for the M3 was initially lacking, until a supply of German 75MM armor piercing rounds were modified to fit the standard American shell case. The modified shells were superior to the new U.S rounds which began to filter into the area. They only began to reach the front lines; however, a few weeks before Rommel's attack and little information is available as to their use.

The British first received the Grant in North Africa in early 1942 after their retreat to the Gazala Line. One noticeable difference between the Grant and Lee, aside from the turret, was the WE210 double I track, which was only fitted to British M3s. This tank has been fitted with-sandshields and was painted in the overall Light Stone camouflage used on British AFVs in the latter stages of the desert campaigns. (Hunnicutt)

When Rommel attacked the Gazala Line in late May, the British had all the advantages, at least on paper. On 27 May, elements of the 15th Panzer Division ran into elements of the 4th Armored Brigade near Bir Hachem. Unfortunately, the small numbers of Grants were overwhelmed by the numerically superior German force, but not before they had inflicted serious losses on the German tankers. In Rommel's own words, "There was also a British surprise awaiting us here, one which was not to our advantage, the new Grant tank " (The Rommel Papers, pg 206 Liddell-Hart).

Throughout the remainder of the battle for Gazala, the Grants proved to be a serious threat to the German armor and anti-tank guns with its 75MM and 37MM guns, and heavy armor, but poor British tactics and generalship eventually forced the British to retreat in disarray in what had been referred to as the "Gazala Romp" with tremendous losses of both men and equipment. It was also during this battle that the U.S. tankers received their baptism of fire, although under British control in British M3 Grants. Three crews under the command of Major Henry Cabot Lodge had been sent to the mid-East for training and to acquire combat experience. Stationed near Tobruk, they took part in the fighting in mid-June while serving with the 4th Armored Brigade. After taking part in the battles around the Knightsbridge "Box" and Acroma, they took part in the retreat to Egypt, where they were shipped home to train U.S crews. During the fighting, they claimed credit for destroying nine German tanks, the first for U.S. crews against German forces. (The credit for destroying the first enemy tank by U.S. forces goes to the 192nd Tank Battalion in the Philippines by M3s against Japanese tanks on Luzon).

Following the retreat from Gazala, the surviving Grants were involved in desperate rear guard actions which helped the bulk of British forces to withdraw to the relative safety of the El Alamein Line. Dug in here with one flank secured by the Mediterranean Sea and the other by the Quatar Depression, the British were able to take on Rommel head on and decisively defeat him. Under the command of General Montgomery, the Eighth Army launched an all out assault on Rommel in late 1942, with eventually drove the Africa Korps back towards Tunisia where, caught between the Americans advancing from the west and British forces from the east, the German and Italian forces surrendered in mid-1943. During this fighting, the Grant was gradually replaced by its successor, the M4 Sherman, as they became available, but some M3s were still on strength when the Axis forces surrendered in the Spring.

In U.S. service, the M3 was used initially to train the troops of the expanding American armored force until enough M4s were available. In the late Spring of 1942; however, the 1st Armored Division was shipped overseas to Northern Ireland with both its armored regiments equipped with M3s. One of these, the 13th, was assigned to the forces earmarked for the invasion of North Africa. Landing in Oran, the unit was included in a force that was assigned the task of capturing Tunis and Bizerte before the Germans could bring in reinforcements. Their first combat assignment, to seize the town of Djederda and its airfield, was a disaster and resulted in heavy losses. Other fighting in the area at the end of November and in early December severely reduced the unit's strength and even though some M4s were received as replacements, the 13th Regiment was still under strength. In the meantime, additional U.S. medium tanks, both M3s and M4s, had arrived and were soon involved in the Battle of Kasserine Pass.

During the initial stages of this battle, Rommel's experienced veterans ran roughshod on the new American tankers. Using dug-in camouflaged anti-tank guns in conjunction with tanks, the Germans decimated a number of U.S. attacks during the early stages of the battle and destroyed large numbers of M4s. Gradually; however, the American tankers began to learn and, as the battle progressed, they began to take a toll of German tanks. In particular, the M3s of the 13th Regiment defeated two enemy thrusts toward the end of December which helped to stabilize the front and knock some of the steam out of the Axis offensive. Eventually, Rommel was forced to withdraw toward Tunis, and, in the Spring, his forces surrendered to the combined Allied forces.

The only other use of the M3 as a gun tank by U.S. forces took place during the seizure of Makin Atoll by elements of the 27th Infantry Division in conjunction with the attack on Tarawa Atoll by the 2nd Marine Division. Supporting the Army attack was the 193rd Tank Battalion with M3s. They were employed to help the infantry route out Japanese defenders who used their only two light Type 95 tanks as pillboxes. When the island fell on 23 November, this spelled the end of the M3 in U.S. service.

While the M3 was then removed from service with American and British units in Europe and the Pacific, its role as a gun tank was far from over. Nearly 1,400 were shipped to the Soviet Union under Lend-Lease. These were mainly M3A3s and M3A5s and they were not particularly well liked by the Russians, who felt the design was old and outdated. In particular, its high silhouette and limited traverse of its 75MM cannon were disliked by the Soviets,

Besides the Grant, the British also received a number of M3 Lees that were used in the fighting. It appears that all the M3s used by the British were fitted with sand-skirts. This tank had a canvas dust cover fitted to the barrel of the 75MM gun and had a Jerry can rack added to the rear fender along with a stowage bar mounted along side the top of the sandsklrt. (Hunnlcutt)

especially when compared to their own superlative T-34. The Russians used their M3s primarily in secondary attacks, and eventually they were replaced by either M4s or T-34s as they became available.

As the M3s were replaced by the Sherman in the European theater, a large number were refurbished and set to either British forces in the India-Burma Theater, or, to Australian forces in the Southwest Pacific for use against the Japanese. Due to the low quality of Japanese armor, the M3 was deemed suitable to handle the threat. In addition, the thick jungle of both theaters helped to minimize the M3's weaker points which had been brought out in North Africa. Since the thick jungle restricted visibility, the limited traverse of the 75MM gun was not as much of a handicap, and the high position on the 37MM turret provided an excellent field of fire, especially when using the 37MM canister round against attacking Japanese infantry.

In Australian service, the Lee/Grant became the most numerous tank in the country's three armored divisions (1st, 2nd and 3rd), with 752 eventually being received. Some of these were modified with additional armor over the three piece differential housing, and a small number were converted to recovery vehicles.

In Burma, the British and Indian troops of the Fourteenth Army were finally able to go on the offensive in early 1944 after nearly two years of see-saw battles with the Japanese. A number of armored units were equipped with mostly Lees with the commander's cupola removed and these proved instrumental in helping the troops route out the entrenched Japanese defenders. One special modification made to the M3s was the addition of a wire screen over the engine deck to defeat magnetic mines. In the dense jungle conditions, close infantry support was a necessity to forestall suicide attacks against the buttoned up tanks, and the various infantry units fought ferociously to protect the tanks from the equally fanatical Japanese. Tank commanders were especially vulnerable to infantry and sniper fire. During the battle for Mungshigum Ridge, every officer of B Squadron, 3rd Carabiniers was lost to enemy fire while moving up the ridge. During the campaign, the M3 also set a record for the highest operation of armored vehicles when Lees of C Squadron, 3rd Carabiniers captured the 9,000 foot high summit of Kennedy Peak during the capture of Tiddim. This record lasted until Indian tankers fought at elevations of 12,000 feet years later against Pakistan.

When the Burma campaign ended with the capture of Rangoon and subsequent mopping up operations in the Spring of 1945, the M3s had proved to be instrumental in helping the Commonwealth troops root out the dug in enemy troops. They accounted for thousands of Japanese troops and knocked out hundreds of bunkers and gun emplacements. Without their support, the advance would have been far more costly, if even possible, given the conditions, enemy strength and disposition.

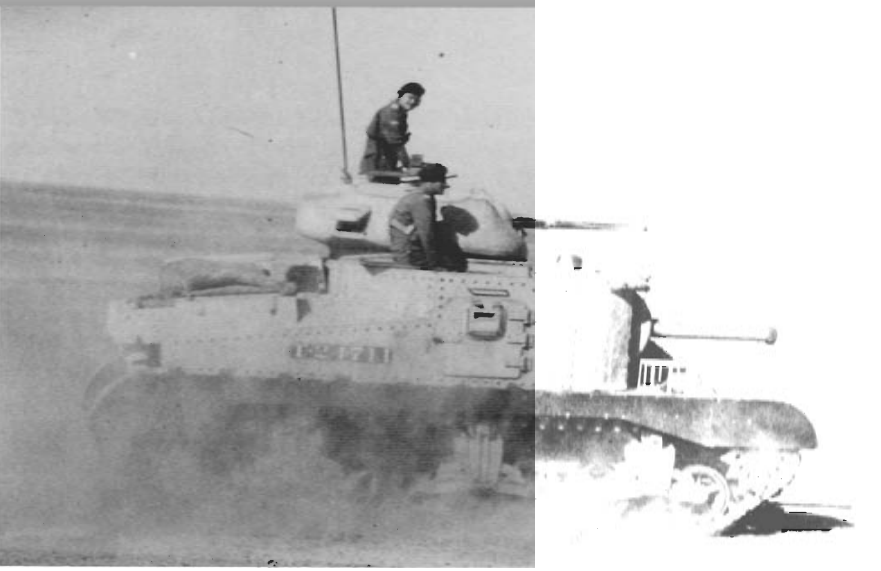
With the end of the war, the M3, already declared obsolete in April of 1944, was quickly retired from service and relegated to either the scrap heal or the target range. A few were saved for museums, but with the surplus of M4s at the end of the war, the M3 was not even supplied to various nations which were rebuilding their armored forces. It quickly disappeared.

In its time: however, it proved its value and paved the way for its successor, the M4 Sherman, without which, the Allies would have lacked a rugged, dependable medium tank to take on the Germans.

Coupled with its early successes in the desert with the British and later American forces, the M3 earned for itself a niche in the history of armored warfare which it rightly deserved.

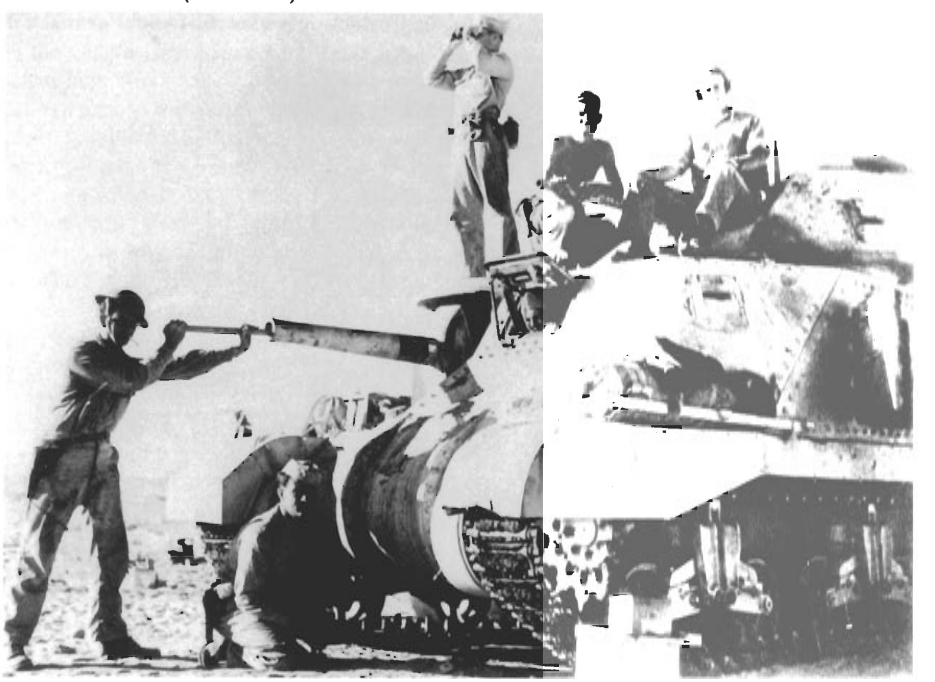
With pennants flying, two columns of Grants, with a Stuart light tank, pass in review during February of 1942. These pennants were used for a number of purposes. The sandskirts are probably Olive Drab, indicating that they have just been installed. The lone Stuart is possibly the regimental navigator's vehicle due to the large number of pennants on its antenna. (Hunnicutt)

A group of British troops take a break in the Summer of 1942 around their Grants and armored cars. During the desert campaign, the Grant helped restore British confidence against the legend of Rommel. The wide disparity in uniforms was common among British troops in desert and was a reflection of the soldiers individuality. (Hunnicutt)



One of the worst problems of conducting armored warfare in the desert, was the huge amounts of sand and dust which the multitude of vehicles kicked up as they moved across the barren surface. This tank shows how the sandskirts helped to cut down some of this dust, although in the final analysis there was no way to really make any kind of real dent in the problem. The British serial number appears to have been painted on the original American Olive Drab, then masked off before the vehicle was camouflaged. (Hunnicutt)

A little known aspect of the war in the desert was the participation of a small American contingent of tankers who were sent to get desert and combat experience. They fought at Qazala and brought back valuable information. The movie "Sahara" was roughly based on this mission. (Hunnicutt)

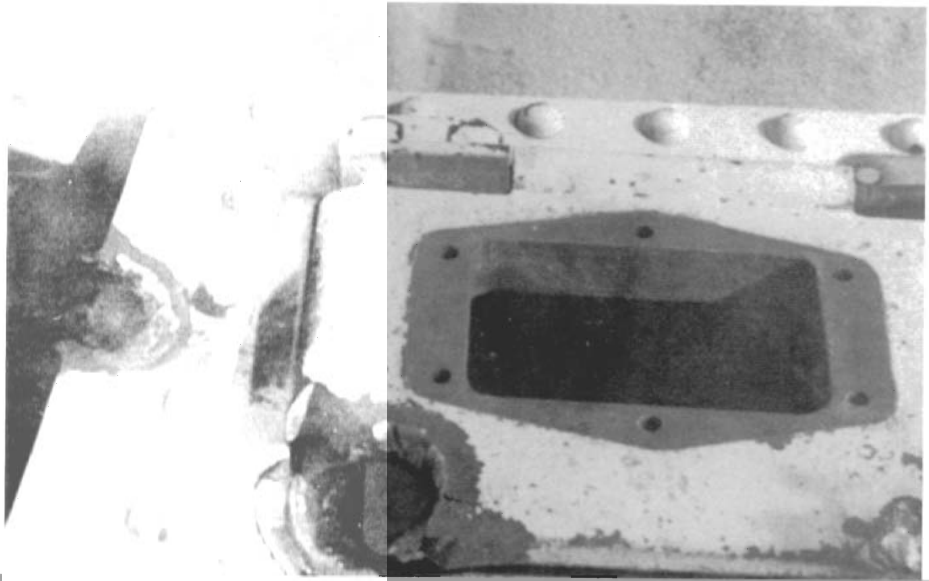


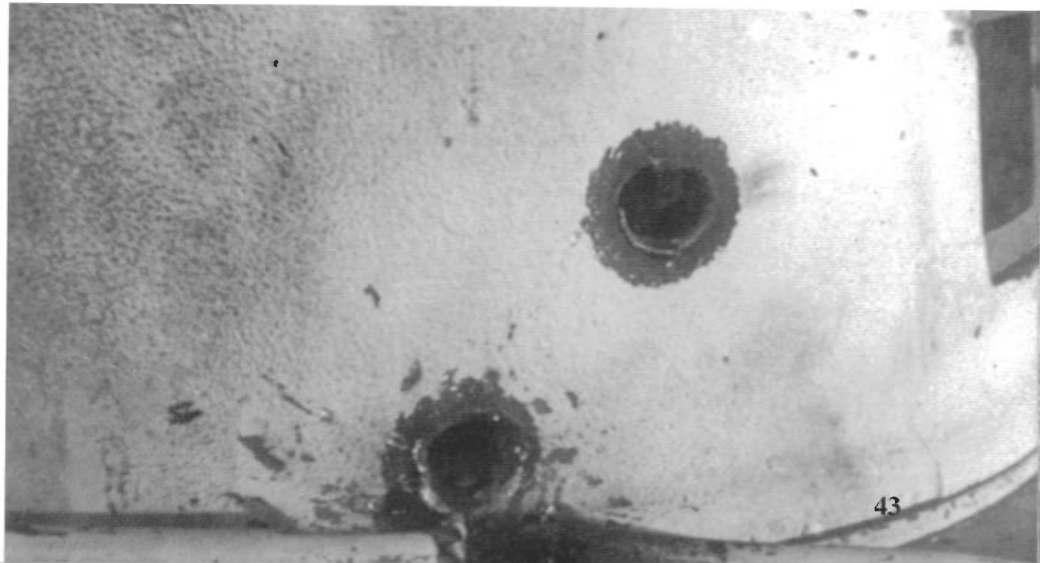
At Gazala the Grant proved to be an unpleasant surprise for Rommel, but poor tactics and leadership at the upper levels allowed Rommel to force the British to retreat. This M3 was knocked out by a 50MM German anti-tank gun near Bir el Harmat in late May,

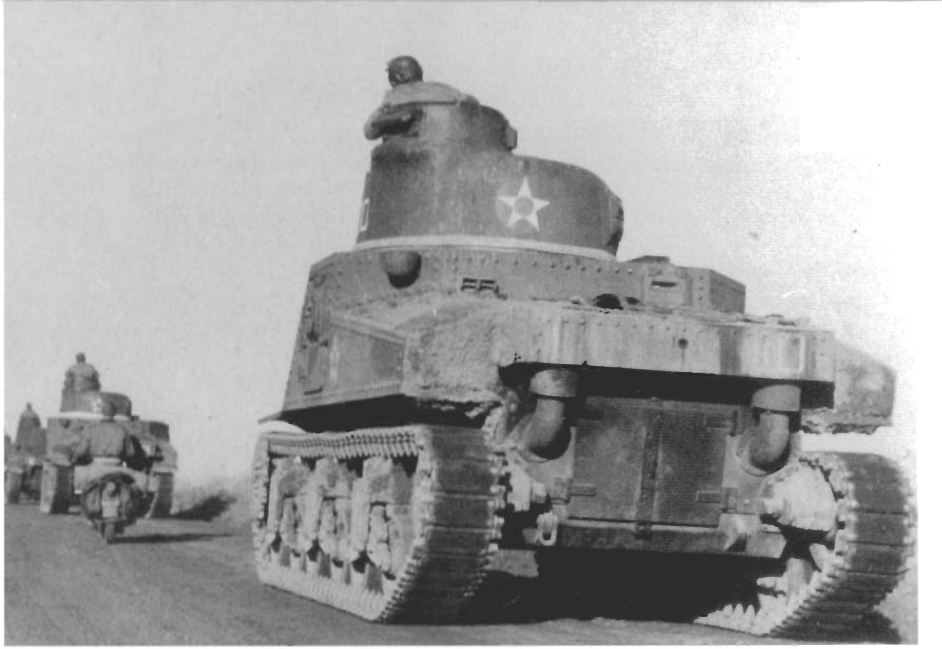
While the Grant was fairly well armored for the time, it was not impervious to German anti-tank and cannon fire, as was evident by the large hole through the drivers views port, although some smaller caliber rounds to the lower right failed to penetrate. From the size of the hole it appears to be an 88MM shell, which no tank could withstand. (PAM)

Following the disastrous defeat at the Gazala Line, the British retreated to El Alamein,where the front stabilized. Here the Eighth Army rebuilt itself and received replacement M3s and newer M4 Shermans. When the British, under Montgomery, finally broke through the German and Italian line, Rommel was forced into a headlong retreat. The crew of this well worn Grant pass a sign pointing to the way to Tripoli. The tank carries a barely visible camouflage pattern of Green over Light Stone.

Small rounds, possibly 50MM or 75MM, penetrated the two inch armor of the 37MM turret with ease. The lower one even hit part of the reinforcing bar across the top of the fighting compartment without lessening its penetration effect. (PAM



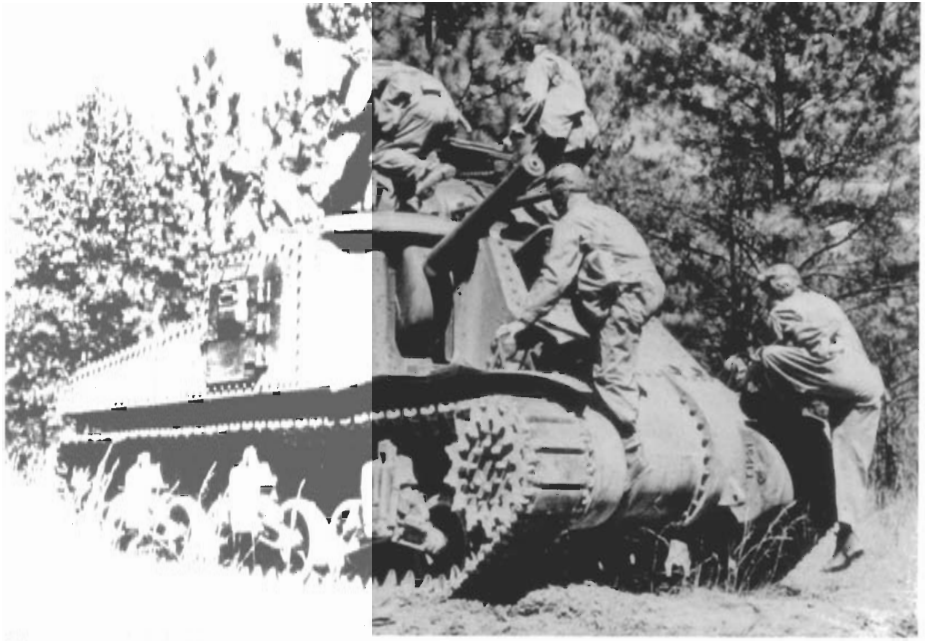




This troop of M3s move down a road at Fort Benning during a road march exercise in early 1942. They are fitted with the early type muffler system which was later revised and modified. Without the rear fenders a large amount of mud was kicked up on the rear hull. (Hunnlcutt)

(Left) The crew of Monty take a break near Tripoli at the end of their drive from El Alamein during early 1943. There is a machine gun mounted above the commander's hatch, which was unusual on British M3s. (USA)

While the British were taking the M3 into combat in North Africa, U.S. troops were finally getting enough M3s to carry out realistic training. These M3s of the 2nd Armored Division were taking part in training at Port Benning, Georgia during February of 1942, just as the M3 was starting to arrive in the desert. These Lee's have not been fitted with rear storage boxes on the back decking. The tanks also carry the early type insignia, similar to the Air Corps but with the red and blue reversed. (Hunnicutt)



The crew of this M3 practice quick boarding techniques, which, in a combat situation, might be the difference between life and death. They are not using the large side hatches to enter the vehicle. Initially, the M3 had a crew of seven, but this was reduced when the radio operator was eliminated, his duties being taken over by the driver. (Hunnicutt)

Under the terms of Lend-Lease, large amounts of American aid was also made available to the Russians. This M3 was captured by the Germans in the Summer of 1942 and used by them for a short period of time. There was an additional German cross on the hull side, behind the open side door.

Since it appeared that the first commitment of American troops would be in North Africa, training was carried out under desert conditions in the southwest. These two M3s are undergoing testing in the Mojave Desert. The one to the right is fitted with sandskirts, which was unusual for an American M3. It might have been one from the British contract being used for evaluation purposes. (Hunnicutt)

The M3 was not only the first U.S. medium tank which would see combat, it also was the first medium tank procured in large quantities allowing American troops to get actual first-hand information in the handling of armored units. In fact, probably more were used in training then saw combat overseas with American tankers. This M3 from the 7th Armored Division awaits repairs during maneuvers in Louisiana in the Fall 1942. This M3A1 is a late production vehicle with the downward folding hatch over the fighting compartment and no side doors. It also was fitted with the later style exhausts and air filters (mufflers).

As the U.S. Army began to gear up, large quantities of material began to reach the troops in training, allowing for testing of a variety of tactics. This M2 halftrack takes part in a combined operation with a group of M3s at Fort Benning in the Spring of 1942. The troops in the M2 are still wearing the old style First World War helmets, which saw limited use in the early days of the war in the Pacific. (Hunnicutt)

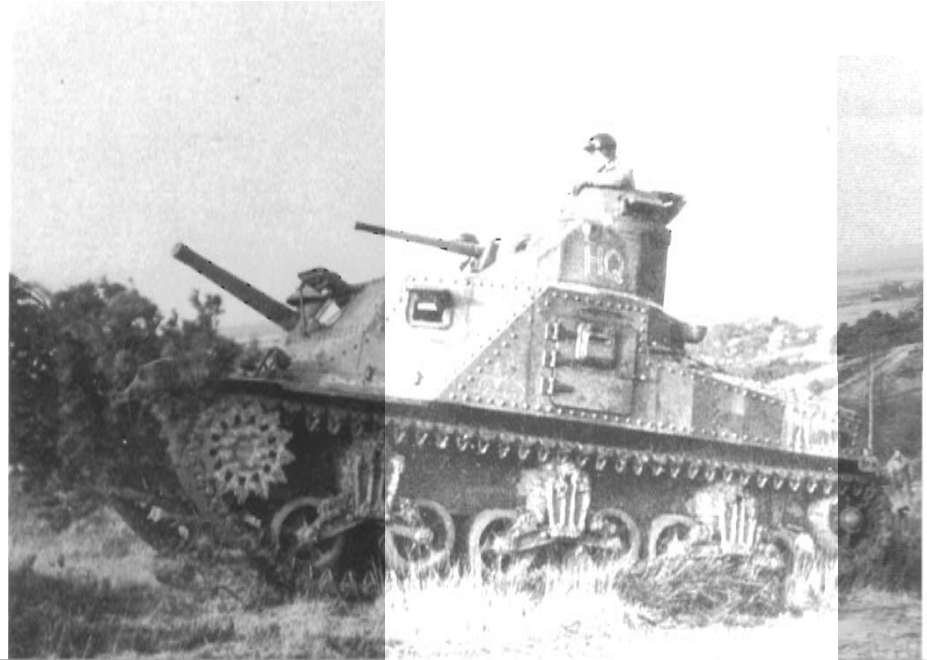
Working with the infantry was a necessary skill which took long hours of practice to obtain. The integration of all components of the armored division were areas which American troops needed practice and throughout their stay in Northern Ireland the 1st Armored Division spent long hours on maneuvers. Both the tankers and infantry were wearing gas masks for this exercise and for security reasons the censors have deleted all markings which might violate security. (Hunnicutt)

In May of 1942, the 1st Armored Division deployed to Northern Ireland equipped with M3s. While there, they continued to train throughout the Summer and early Fall. A group of tankers await inspection in front of their tanks which have a mixture of both the M2 and M3 75MM cannons mounted in the hull sponson. (Hunnicutt)

A long column of M3s move across the Northern Ireland countryside in the late Summer of 1942. The closest tank has the counterbalance fitted to its 75MM gun and a spare track block box just below the drivers viewport. Most of the other tanks appear to have the long barreled M3 75MM gun. (Hunnicutt)

COFFEE GRINDER, a late production M3 fitted with a long barreled 75MM gun, moves along at a fair speed over an open field. The vehicle's serial number at the rear was in Blue Drab, a practice used early in the war to reduce visibility, although as the war progressed White was often substituted during repainting. With a top speed of 24 mph the M3 was fairly fast. This speed; however, could not be sustained for a great length of time or over uneven ground. (Hunnicutt)

The M3 played just as valuable a training role for the Canadian troops as it did for the American troops since the Canadians had never had large numbers of modern vehicles to work with. This M3 from a headquarters unit topples a small pine tree during exercises in England, although this was not the norm unless absolutely necessary. (Hunnicutt)

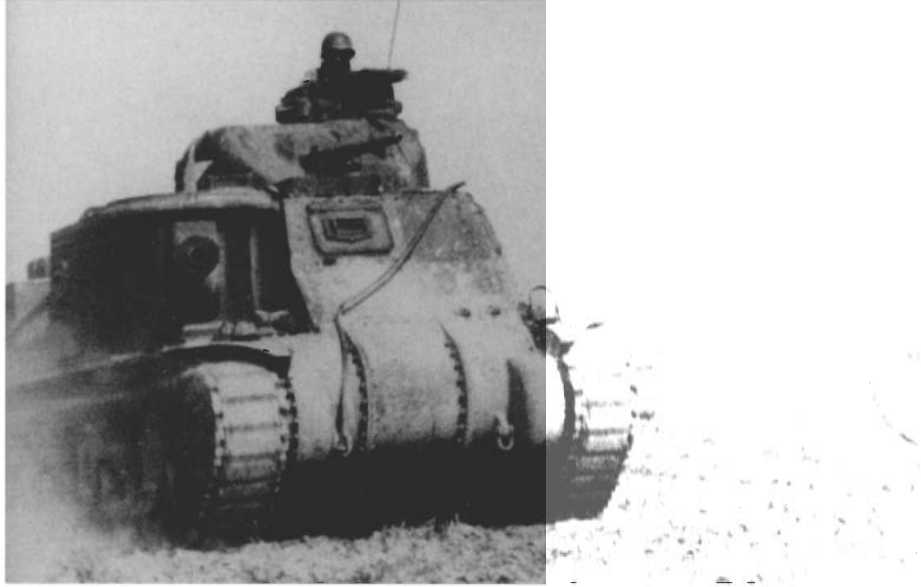


Canadian troops from the Fort Garry Horse Regiment board their M3 during training in England in 1942. The Canadians also produced their own tank, the Ram, based on the M3 but when sufficient supplies of M4s became available these were relegated to training and support roles. (Hunnicutt)

Two M3s await orders to move out during training in England. The triangle indicates "A" squadron, while the square denotes a headquarters tank. It appears that the unit markings on the front hull have been covered over with mud for security reasons. Both tanks have been fitted with extra storage boxes and mud chutes. (Hunnicutt)

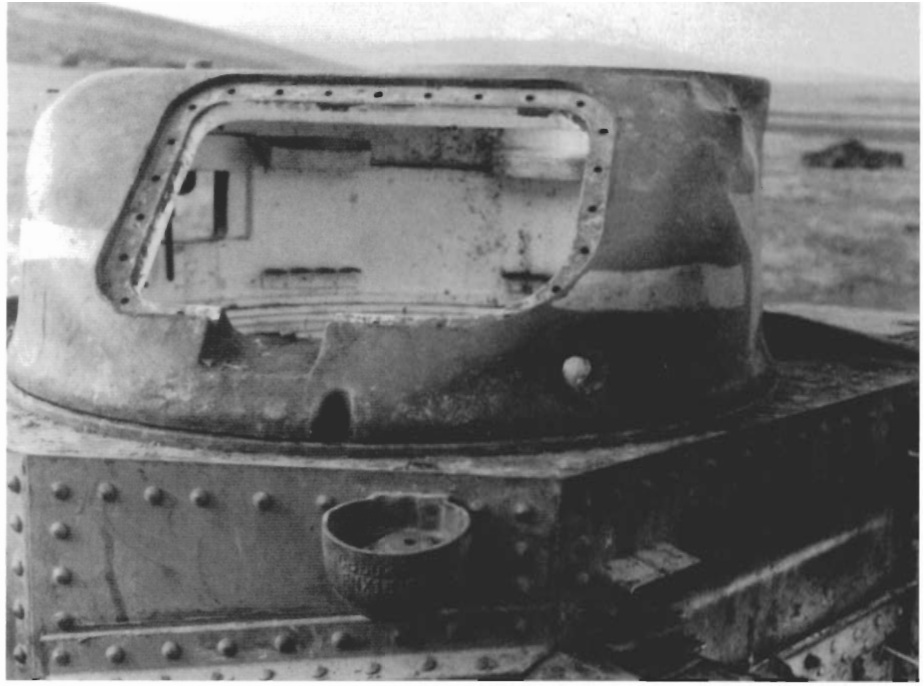
The first American tankers to see combat in North Africa under their own commanders were elements of the 1st Armored Division, which took part in the invasion of Oran. This M3 from the 2nd Battalion, 13th Armored Regiment and its crew, were at Souk El Khemis, Tunisia during operations against German forces holding the airfield at Djedeida. The name, Kentucky, appears to be White. The star, band and unit identification marking on the hull are probably in Yellow, which was used for some time on M3s in combat. (PAM)

While the M3 was superior to earlier American tanks, its armor was not able to withstand fire from the main German anti-tank guns then in use. This M3 was knocked out by an 88MM shell near Sened, Tunisia, during February of 1943. It appears to have been completely burned out. The hatches were probably blown off when the internal ammunition was ignited and blew up. (USA)



The first major confrontation with Rommel's Afrika Korps took place during the battle of Kasserine Pass in mid-February of 1943. The inexperienced American tankers were badly mauled by the veteran German tankers and suffered huge losses in men and material. This M3 was moving up toward the pass during the latter stages of the battle. The lack of camouflage paint made the O.D. tanks stand out in the desert and many crews applied a rough paste of mud to help them blend in. (PAM)

The crew of this M3 are fairly proud of their tank's namesake as they cast admiring glances at her picture on the side of their mount. While some higher commands frowned on such practices, most troops who wanted to do so were usually able to get away with it. (PAM)



The hull of this M3 was being salvaged for spare parts after the battle at Kasserine Pass. The penetration through the turret does not appear to have caused a fire or explosion but the metal fragments alone from the hit would probably have been enough to have killed or severely wounded the crew.

As the Sherman became available in large numbers, the M3 was relegated to training or to less demanding fronts in terms of tank vs tank combat. In Burma, the M3 played a vital role in helping drive out the Japanese. Often the cupola was removed and a wire screen was put over the rear deck to provide protection against explosive charges being placed there by suicidal Japanese infantry. In the close jungle conditions the high profile of the Grant and Lee provided a good observation platform to spot Japanese positions, but sniper fire was deadly for the tank commander and close cooperation with infantry was needed. (Hunnicutt)

Two M31s prepare to pull a truck out of a ditch near Les Rouges Eaux, France in the Fall of 1944. The nearest M31 was painted in what appears to be a four color camouflage pattern. (USA)

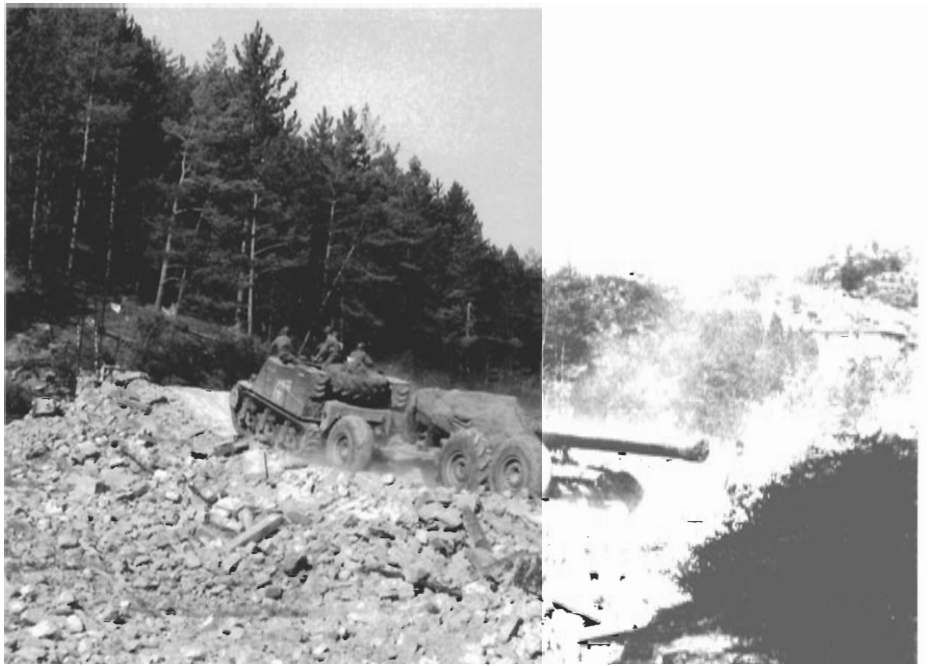
A M31 tows a damaged German Sturmgeschultz III Ausf G back from the front in Italy near Mount Lungo during January of 1944. A ring mount for a machine gun has been mounted on top the turret. (PAM)

A pair of M31s of the 2nd Armored Division try to retrieve a M4 Sherman which was disabled by a mine near Stolberg, Germany near the end of the war. Each M31 was covered with extra gear. (USA)

An unusually marked M31 of the 191st Tank Battalion at Innsbruck, Austria during the Spring of 1945. There are welded on bars on top the fighting compartment, and, to lower ground pressure on soft ground, track extenders have been attached to the tracks. (Crow)

A M31 crosses a small stream under a destroyed German bridge on the outskirts of Stolberg, Germany toward the end of the war. The M31 was relatively uncluttered, which was unusual for such vehicles. (USA)

An M33 pulls a 240MM howitzer over a rough road near Vagila, Italy during 1944. The howitzer has two different types of tire patterns, and an additional tire was carried on top of the rear deck of the M33. (USA)



A M3 of the 2nd Armored Division crosses a temporary bridge during exercises near Fort Benning, Georgia, during December of 1941.

Robin Hood II, a British M3 Grant of the Notinghamshire Yeomanry Regimental Headquarters, 8th Armored Brigade, 10th Armored Division, at El Alamein during October of 1942.

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